Cat. No. Z249-E1-02

V680 Series

ID Controller

USER'S MANUAL

OMRON

Introduction

Thank you for purchasing a V680-series RFID System. This manual describes the functions, performance, and application methods needed for optimum use of the V680-series RFID System.

Please observe the following items when using the RFID System.

- Allow the RFID System to be installed and operated only by qualified specialist with a sufficient knowledge of electrical systems.
- Read and understand this manual before attempting to use the RFID System and use the RFID System correctly.
- Keep this manual in a safe and accessible location so that it is available for reference when required.

RFID System

V680-CA5D01-V2	ID Controller
V680-CA5D02-V2	ID Controller

User's Manual

READ AND UNDERSTAND THIS DOCUMENT

Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

SUITABILITY FOR USE

THE PRODUCTS CONTAINED IN THIS DOCUMENT ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to separate catalogs for OMRON's safety rated products.

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

• Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.

• Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.

• Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PERFORMANCE DATA

Performance data given in this document is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

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Safety Precautions

● Alert Symbols for Safe Use

The following symbols are used in this manual to indicate precautions that must be observed to ensure safe use of the V680-CA5D01-V2 / -CA5D02-V2. The precautions provided here contain important safety information. Be sure to observe these precautions.
The following signal words are used in this manual.

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally, there may be significant property damage.

● Meanings of Alert Symbols

🚫	**Indicates general prohibitions for which there is no specific symbol.**

● Warning

⚠ WARNING

This Product is not designed to be used either directly or indirectly in applications that detect human presence for the purpose of maintaining safety. Do not use this Product as a sensing device for protecting human lives.
🚫

Regulations and Standards

The V680-CA5D01-V2 / -CA5D02-V2 conform to the following overseas regulations and standards.

1. UL Standards

   The V680-CA5D01-V2 and V680-CA5D02-V2 meet UL (Underwriter's Laboratories Inc.) conditions.

   UL508

   c Ⓤ US

   Connect to either circuit type (1) or (2) listed below.

   (1) Limited Voltage/Current Circuit (Approved under UL508)

   A circuit that uses the secondary windings of an isolation transformer as its power supply and fulfills the following conditions:

   • Maximum voltage: 30 Vrms (42.4 V peak)

     and

   • Maximum current: (a) 8 A (including short-circuits) or

   (b) Current limited by a circuit protection device (e.g., fuse) with the ratings listed in the following table.

No-load voltage (V peak)	Maximum current rating (A)
0 to 20	5.0
Over 20 to 30	$\dfrac{100}{\text{Peak voltage}}$

(2) A class 2 circuit with a maximum voltage of 30 Vrms (42.4 V peak) that uses a class 2 power supply unit conforming to UL1310 or a class 2 transformer that conforms to UL1585 as its power source.

2. EMC Standards

The V680-CA5D01-V2 and V680-CA5D02-V2 meet the requirements of the following EC Directives.

EMC Standard: EN 61000-6-2
EN 61000-6-4

Precautions for Safe Use

Be sure to observe the following precautions to ensure safe use of the Product.

1. Do not use the Product in environments with flammable, explosive, or corrosive gasses.
2. Do not attempt to disassemble, repair, or modify the Product.
3. Tighten the base mounting screws and terminal block screws securely.
4. Be sure to use crimp terminals of the specified size for wiring.
5. If any cable has a locking mechanism, make sure that it has been locked before using the cable.
6. Make sure the power supplied by the DC power supply unit is within the rated power supply voltage (24 VDC +10%/−15%) before using the Product.
7. Do not connect the power supply in reverse.
8. Do not allow water or wires to enter the Product through gaps in the case. Otherwise, fire or electric shock may occur.
9. Turn OFF the power to the Controller before attaching or removing an Amplifier or Antenna.
10. If an error is detected in the Product, immediately stop operation and turn OFF the power supply. Consult with an OMRON representative.
11. Dispose of the Product as industrial waste.
12. Observe all warnings and precautions given in the body of this manual.

Precautions for Correct Use

Always observe the following precautions to prevent operation failure, malfunctions, and adverse effects on performance and equipment.

1. Installation Environment

Do not use the Product in the following locations.
- Locations exposed to corrosive gases, dust, metallic powder, or salts
- Locations not within the specified operating temperature range
- Locations subject to rapid changes in temperature or condensation
- Locations not within the specified operating humidity range
- Locations subject to direct vibration or shock outside the specified ranges
- Locations subject to spray of water, oil, or chemicals

2. Installation

- This Product uses a frequency band of 13.56 MHz to communicate with ID Tags. Some transceivers, motors, inverters, switching power supplies, etc., generate electrical noise that will affect these communications. If any of these devices are located in the vicinity of the Product, they may affect communications with ID Tags, and may possibly damage the ID Tags. Prior to using the Product in the vicinity of any of these devices, perform a test to determine whether the Product can be used under the resulting influence.
- Observe the following precautions to minimize the effects of normal noise.
  (1) Ground the ground terminal on the Product and all metal objects in the vicinity of the Product to 100 Ω or less.
  (2) Do not use the Product near high-voltage or high-current lines.
- The Product is not waterproof. Do not use it in an environment where mist is present.
- Do not expose the Product to chemicals that adversely affect the Product materials.
- Use a tightening torque of 1.2 N·m max.
- If multiple Antennas are mounted near each other, communications performance may decrease due to mutual interference. Refer to *Installing Antennas* in the *V680 Series User's Manual* for Amplifiers, Antennas, and ID Tags (Cat. No. Z262 , Z248) and check to make sure there is no mutual interference.

3. Storage

Do not store the Product in the following locations.
- Locations exposed to corrosive gases, dust, metallic powder, or salts
- Locations not within the specified operating temperature range
- Locations subject to rapid changes in temperature or condensation
- Locations not within the specified storage humidity range
- Locations subject to direct vibration or shock outside the specified ranges
- Locations subject to spray of water, oil, or chemicals

4. Cleaning

- Do not clean the Product with paint thinner, benzene, acetone, or kerosene. These chemicals will dissolve the resin materials and case coating.

Meanings of Symbols

CHECK!   Indicates particularly important points related to a function, including precautions and application advice.

Indicates page numbers containing relevant information.

? Indicates reference to helpful information and explanations for difficult terminology.

Table of Contents

SECTION 1
Product Overview

Features

The V680-CA5D01-V2 / -CA5D02-V2 ID Controllers connect to V680-HA63 Amplifiers and V680-HS@@ Antennas, or to V680-H01 Antennas, to read and write data for V680-series ID Tags according to commands from the host device. The ID Controller returns the results of executing these commands as responses to the host device.

CHECK! The ID Controller can communicate with Tags that conform to ISO 18000-3 (ISO 15693). The ID Controller may not be able to communicate with Tags that are not V680-series Tags. Always confirm that communications are possible in advance.

SECTION 1 Features
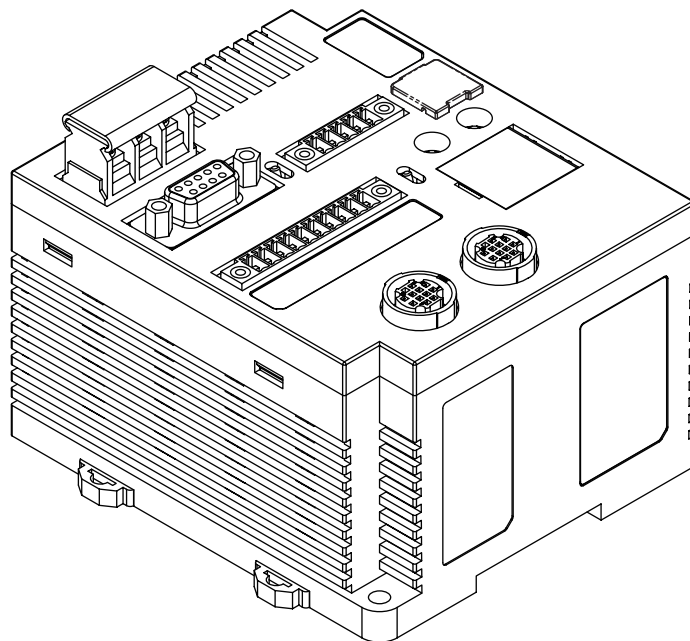
■ Differences between the V680-CA5D@@ and V680-CA5D@@-V2

The following functions have been added to the V680-CA5D@@-V2 in addition to those found on the V680-CA5D@@. These functions are upward-compatible with the V680-CA5D@@, so the V680-CA5D@@ can be directly replaced by the V680-CA5D@@-V2.

▪ New Commands Added

The following commands have been added.

READ TAG MEMORY ERROR CORRECTION	QR	Reads the Tag's memory contents. Also uses a memory check code to inspect data reliability.
WRITE TAG MEMORY ERROR CORRECTION	QW	Writes data to the memory of the Tag. Also writes the memory check code for the data reliability inspection to the memory of the Tag.
READ ID	ID	Reads the Tag's ID code.
UID ADDITION SET	US	Sets whether or not UID should be added to the read command (RD) response.

▪ Communications Designations Added

Multi-access, FIFO, and selective have been added to the communications designations.

Note: These designations cannot be used for communications with the V680-D1KP@@.

▪ V680-H01 Antenna Connection Supported

The V680-H01 Antenna can be used by setting DIP SW4, pin 8.

CHECK! The V680-H01 Antenna can be connected only to the V680-CA5D01-V2 ID Controller. It cannot be used with the V680-CA5D02-V2 ID Controller.

▪ High-speed Data Transmission Supported

High-speed data transmission is possible by setting DIP SW4, pin 10.

CHECK! The high-speed mode cannot be used with the V680-H01 Antenna.

DIP SW4

8 — V680-H01 Antenna connection setting (DIP SW4, pin 8)

0 — High-speed Data Transmission setting (DIP SW4, pin 10)
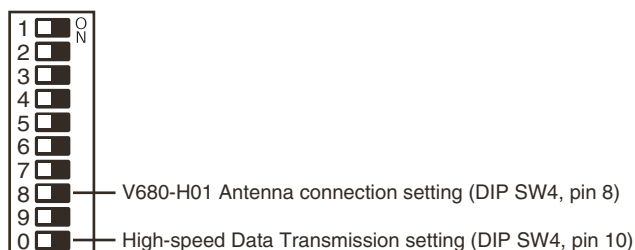
Part Names and Functions

■ Part Names

▪ V680-CA5D01-V2

Controller Number Switches   Main Indicators

Switch Cover

USB Port

RS-422/RS-485 Port

Terminating Resistance Switch

Power Supply Terminals

Ground Terminal

RS-232C Port

Monitor display

Bar Indicator

Mode Switch

Antenna Port

Antenna Operation Indicators

External I/O Port

▪ V680-CA5D02-V2

Controller Number Switches   Main Indicators

Switch Cover

USB Port

RS-422/RS-485 Port

Terminating Resistance Switch

Power Supply Terminals

Ground Terminal

RS-232C Port

Monitor display

Bar Indicator

Mode Switch

Antenna Port

Antenna Operation Indicators

External I/O Port

■Power Supply and Ground Terminals

Description	Description
Power supply terminals	Supply 24 VDC power to these terminals. Recommended power supply: OMRON S8VS-03024.
Ground terminal	The ground terminal. Connect this terminal to an independent ground line connected to 100 Ω. or less.

■External I/O Port

The external I/O port is used to connect external I/O signals.

There are two external I/O signal arrangements that can be used for the same port: the same signal arrangement as the V600-CA5D@@ and a signal arrangement unique to the V680-CA5D@@-V2.

The desired I/O signal arrangement can be specified using the PARAMETER SET (SP) command. In Self-execution Mode, the use of ports other than RUN and RST can be set.

Description		Description
V600 I/O	V680 I/O	
RUN		Turns ON when the ID Controller is operating normally and the communications are possible with the host device.
BUSY	OUT3	BUSY: Output from when a tag communications command is received from the host device until tag communications have been completed. OUT3: User output 3. This output can be controlled with the CONTROLLER CONTROL (CC) command.
ERROR	OUT4	ERROR: Output for 500 ms when a tag communications error, host communications error, or hardware error has occurred. The output time can be changed with the PARAMETER SET (SP) command. OUT4: User output 4. This output can be controlled with the CONTROLLER CONTROL (CC) command.
OUT1		OUT1: User output 1. This output can be controlled with the CONTROLLER CONTROL (CC) command.
OUT2		OUT2: User output 2. This output can be controlled with the CONTROLLER CONTROL (CC) command.
COM_O		Common terminal for outputs.
RST		External reset input for emergency stops. The ID Controller is reset when an input is received.
TRG1		**V680 Command System** If a trigger communications designation (SI, RI, or PI) is specified, the command received by Antenna 1 will be executed on the rising edge of the TRG1 input. If any other communications designation is specified, TRG1 is used as user input 1, which can be read using the CONTROLLER CONTROL (CC) command. **V600 Command System** If pin 6 on DIP switch SW4 (Lower Trigger Execution Setting) is turned ON, any command already received by Antenna 1 will be executed on the rising edge of the TRG1 Input. If pin 6 is turned OFF, TRG1 is used as user input 1, which can be read using the CONTROLLER CONTROL (CC) command.
TRG2		**V680 Command System** If a trigger communications designation (SI, RI, or PI) is specified, the command received by Antenna 2 will be executed on the rising edge of the TRG2 input. If any other communications designation is specified, TRG2 is used as user input 2, which can be read using the CONTROLLER CONTROL (CC) command. **V600 Command System** If pin 6 on DIP switch SW4 (Lower Trigger Execution Setting) is turned ON, any command already received by Antenna 2 will be executed on the rising edge of the TRG2 input. If pin 6 is turned OFF, TRG2 is used as user input 2, which can be read using the CONTROLLER CONTROL (CC) command.
COM_I		Common terminal for inputs

■ RS-232C Port

The RS-232C port is used to communicate with a host device. A computer, PLC, or similar host device with an RS-232C interface can be connected.

■ RS-422/RS-485 Port

The RS-422/RS-485 port is used to communicate with a host device. Computers, PLCs, and similar host devices with RS-422/RS-485 interfaces can be connected.

■ USB Port

The USB port is used to connect to a computer via a USB cable. The port is USB 1.1. Communications with host devices using USB connections can be made using only 1:1 protocol, regardless of the setting of pin 9 on DIP switch SW3.

The USB port is not a control port. Always use the RS-232C port or RS-422/RS-485 port when building systems.

CHECK! p. 17

■ Antenna Port

The antenna port is used to connect V680-series Amplifiers and Antennas.

■ Controller Number Switches

The Controller number switches are used to set the number of the ID Controller when connecting more than one ID Controller to one host device.

Refer to *Controller Number Switch Settings (SW1, SW2)* for details on this switch.

CHECK! p. 54

■ Switch Cover

There are two DIP switches behind the switch cover for making settings.

Refer to *DIP Switch Settings (SW3, SW4)* for details on these switches.

CHECK! p. 55

■ Mode Switch

The mode switch is used to change the ID Controller's operation mode (between Run and Maintenance Mode).

Refer to *Mode Switch Setting* for details on this switch.

CHECK! p. 57

■ Terminating Resistance Switch

This switch can be use to connect or disconnect the internal terminating resistance.

Refer to *Terminating Resistance* for details on this switch.

CHECK! p. 57

■ **Main Indicators**

Indicator	Color	Description
RUN/RST	Green	Lit while the ID Controller is operating normally.
	Red	Lit while external reset signal is being input.
COMM	Green	Lit during normal communications with a host device.
	Red	Lit when an error is detected for communications with a host device.

■ **Antenna Operation Indicators**

Indicator	Color	Description
COMM1	Yellow	Lit during processing of commands for Tag communications by Antenna 1.
NORM1/ ERR1	Green	Lights once upon normal completion of processing by Antenna 1.
	Red	Lights once when processing ends in an error at Antenna 1.
COMM2 (See note.)	Yellow	Lit during processing of commands for communications with Tags by Antenna 2.
NORM2/ ERR2 (See note.)	Green	Lights once upon normal completion of processing by Antenna 2.
	Red	Lights once when processing ends in an error at Antenna 2.

**Note:** The V680-CA5D01-V2 does not have COMM2 or NORM2/ERR2 indicators.

■ **Monitor Display**

Indicator	Color	Mode		Description
7-segment display (2 digits)	Red	Run Mode	Command Execution Mode	Displays end codes.
			Self-execution Mode	
		Maintenance Mode	Distance Level Measurement Mode	Converts and measures the Antenna output at six levels. The level is displayed as either "EE" or 01 to 06. "--" will be displayed if there is no Tag in the Antenna's communications area.
			Tag Communications Test Mode	Communicates with Tags and displays end codes. p. 131
			Speed Level Measurement Mode (read/write)	Repeatedly communicates with moving Tags and displays the number of successful communications between 01 and 99. The display will show 99 even if more than 99 successful communications were made. "EE" will be displayed if the first communication after the Tag entered the communications area fails.
			Noise Level Measurement Mode	Displays the ambient noise level between 00 and 99.
			Communications Success Rate Measurement Mode	Communicates 100 times with a Tag with no retries, and displays the communications success rate between 01 and 99 (%). If no communications were successful, "EE" is displayed. If all communications were successful, "FF" is displayed.

▪ Run Mode (SW5 OFF)

In Run Mode, the end codes for command processing is displayed. The end code is displayed in 2-digit hexadecimal, as shown below.

The display is lit for normal and warning responses and flashes for error responses.

Hexa-decimal	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Display	0	1	2	3	4	5	6	7	8	9	A	b	C	d	E	F
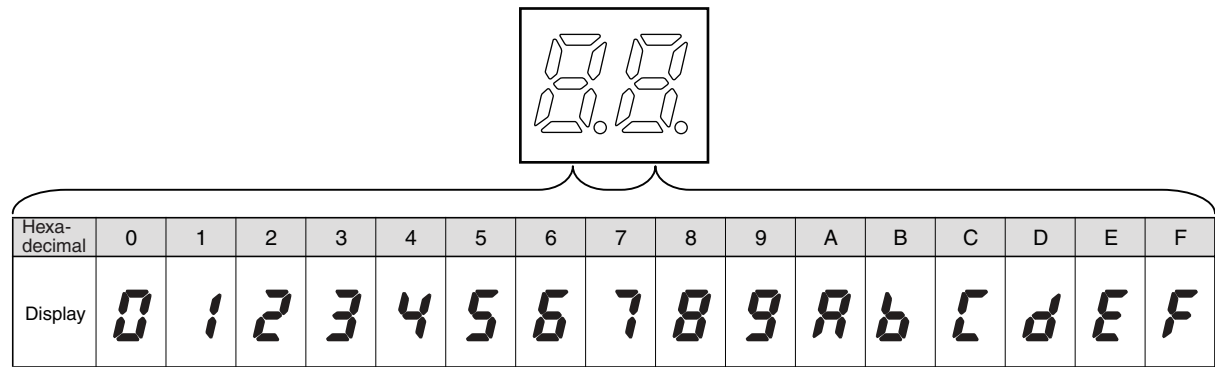
CHECK! The error code "15" will be displayed if the operation conditions have not been set and operation is switched to Self-execution Mode.

▪ Maintenance Mode (SW5 ON)

In Maintenance Mode, the measurement results for each measurement mode is displayed in 2-digit decimal.

■ Bar Indicator

Indicator	Color	Description	
1	Yellow	The Antenna and the Tag are far apart.	The Tag travel speed is fast.
2	Yellow	↑	↑
3	Yellow				
4	Yellow				
5	Yellow	↓	↓
6	Yellow	The Antenna and Tag are close.	The Tag travel speed is slow.

Bar Indicator
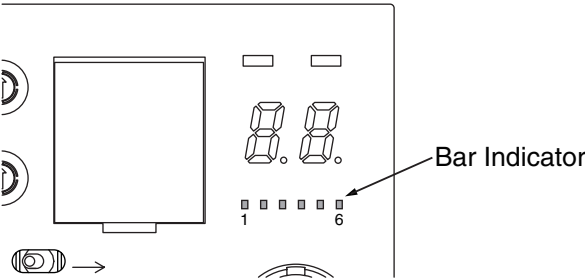
System Configuration

1:1 Connection

One host device is connected via the RS-232C, RS-422, or RS-485 interface.

• Using an Antenna Other than the V680-H01
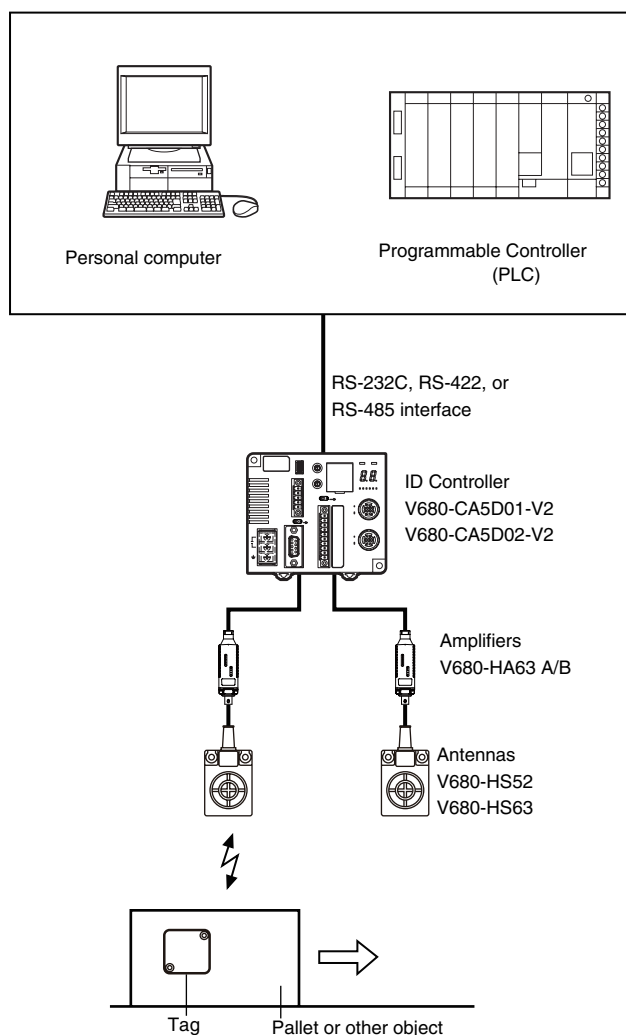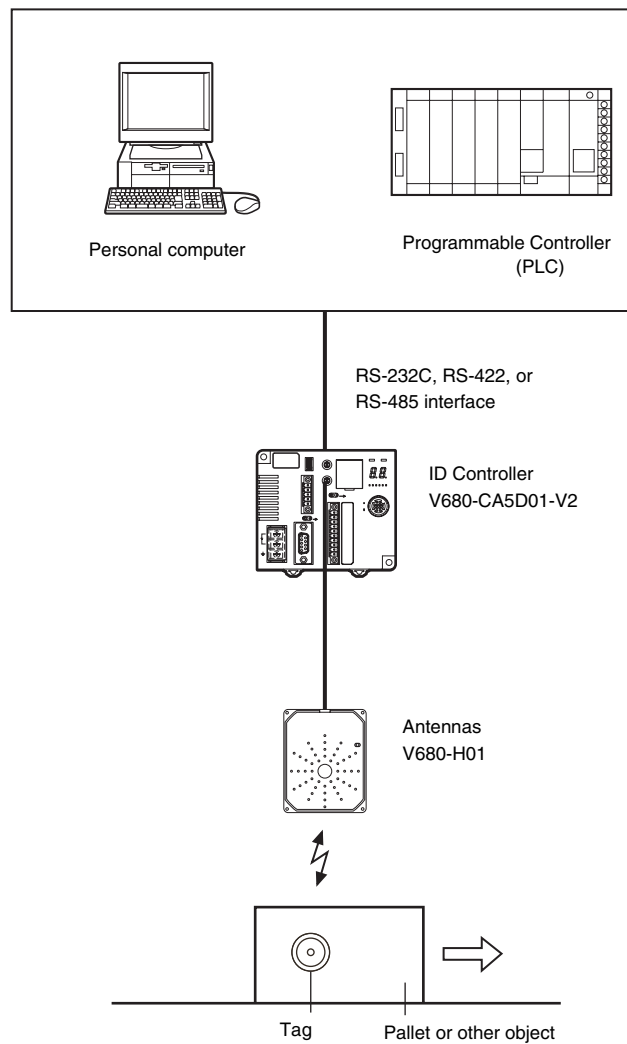
Personal computer

Programmable Controller (PLC)

RS-232C, RS-422, or RS-485 interface

ID Controller
V680-CA5D01-V2
V680-CA5D02-V2

Amplifiers
V680-HA63 A/B

Antennas
V680-HS52
V680-HS63

Tag   Pallet or other object

• Using a V680-H01 Antenna

Personal computer

Programmable Controller (PLC)

RS-232C, RS-422, or RS-485 interface

ID Controller
V680-CA5D01-V2

Antennas
V680-H01

Tag   Pallet or other object

CHECK!

The V680-H01 Antenna can be connected only to the V680-CA5D01-V2 ID Controller. It cannot be used with the V680-CA5D02-V2 ID Controller

1:N Connections with RS-232C Connection to Host Device

The host device can be connected via RS-232C and then other ID Controllers can be connected via RS-422/RS-485 interfaces.

• Using an Antenna Other than the V680-H01

Personal computer

Programmable Controller (PLC)

RS-232C

RS-422/RS-485   RS-422/RS-485   RS-422/RS-485

ID Controller
V680-CA5D01-V2
V680-CA5D02-V2

Amplifiers
V680-HA63 A/B

Antennas
V680-HS52
V680-HS63

Tag   Pallet or other object   Tag   Pallet or other object

• Using a V680-H01 Antenna

Personal computer

Programmable Controller
(PLC)

RS-232C

RS-422/RS-485   RS-422/RS-485   RS-422/RS-485

ID Controller
V680-CA5D01-V2

Antennas
V680-H01
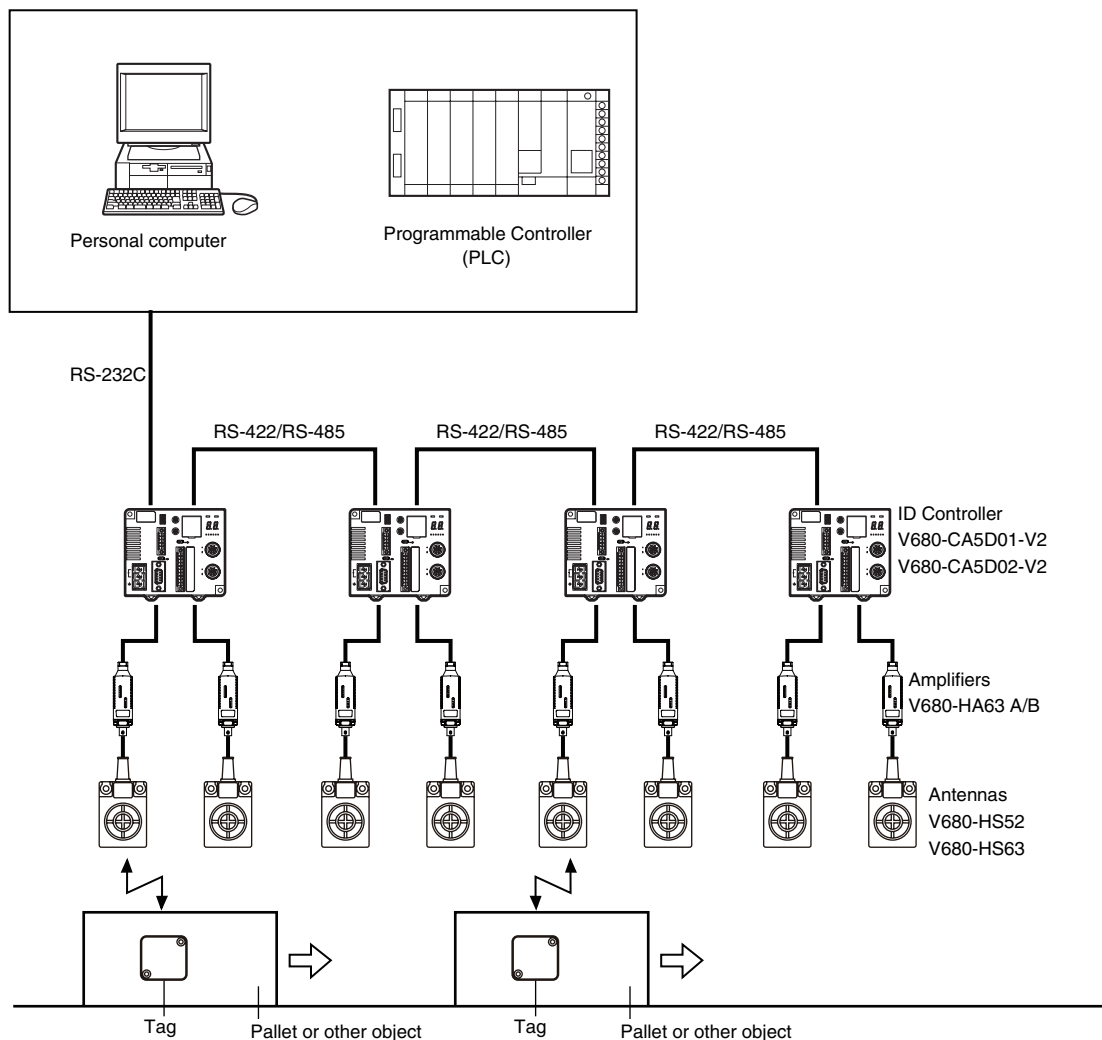
Tag   Pallet or other object   Tag   Pallet or other object

The V680-H01 Antenna can be connected only to the V680-CA5D01-V2 ID Controller. It cannot be used with the V680-CA5D02-V2 ID Controller
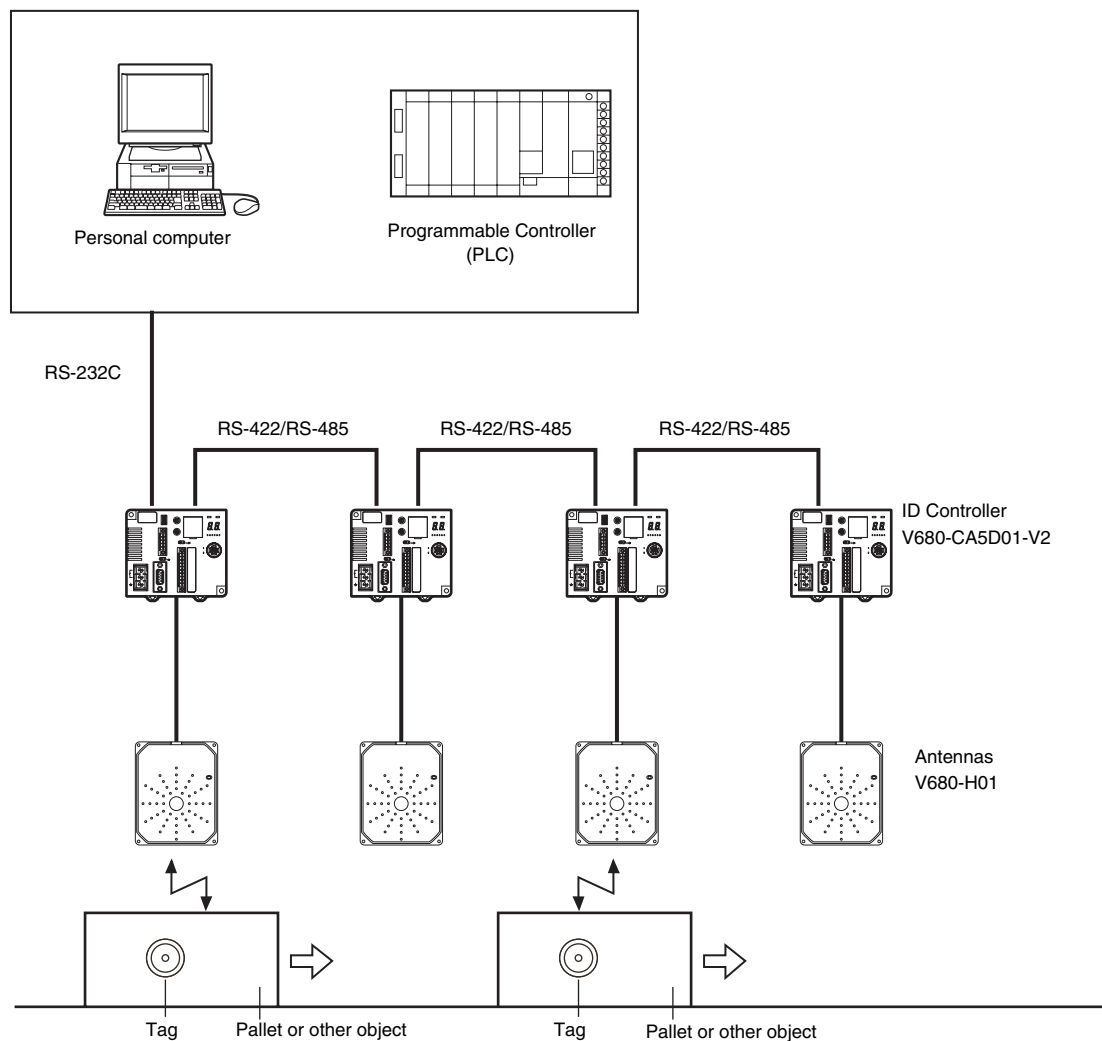
CHECK!

1:N Connections with RS-422/RS-485 Connection to Host Device

The host device and other ID Controllers can all be connected via RS-422 or RS-485 interfaces.

• Using an Antenna Other than the V680-H01

Personal computer

Programmable Controller (PLC)

RS-422/RS-485

RS-422/RS-485   RS-422/RS-485   RS-422/RS-485

ID Controller
V680-CA5D01-V2
V680-CA5D02-V2

Amplifiers
V680-HA63 A/B

Antennas
V680-HS52
V680-HS63

Tag   Pallet or other object   Tag   Pallet or other object

• Using a V680-H01 Antenna

Personal computer

Programmable Controller (PLC)

RS-422/RS-485

RS-422/RS-485   RS-422/RS-485   RS-422/RS-485

ID Controller
V680-CA5D01-V2

Antennas
V680-H01

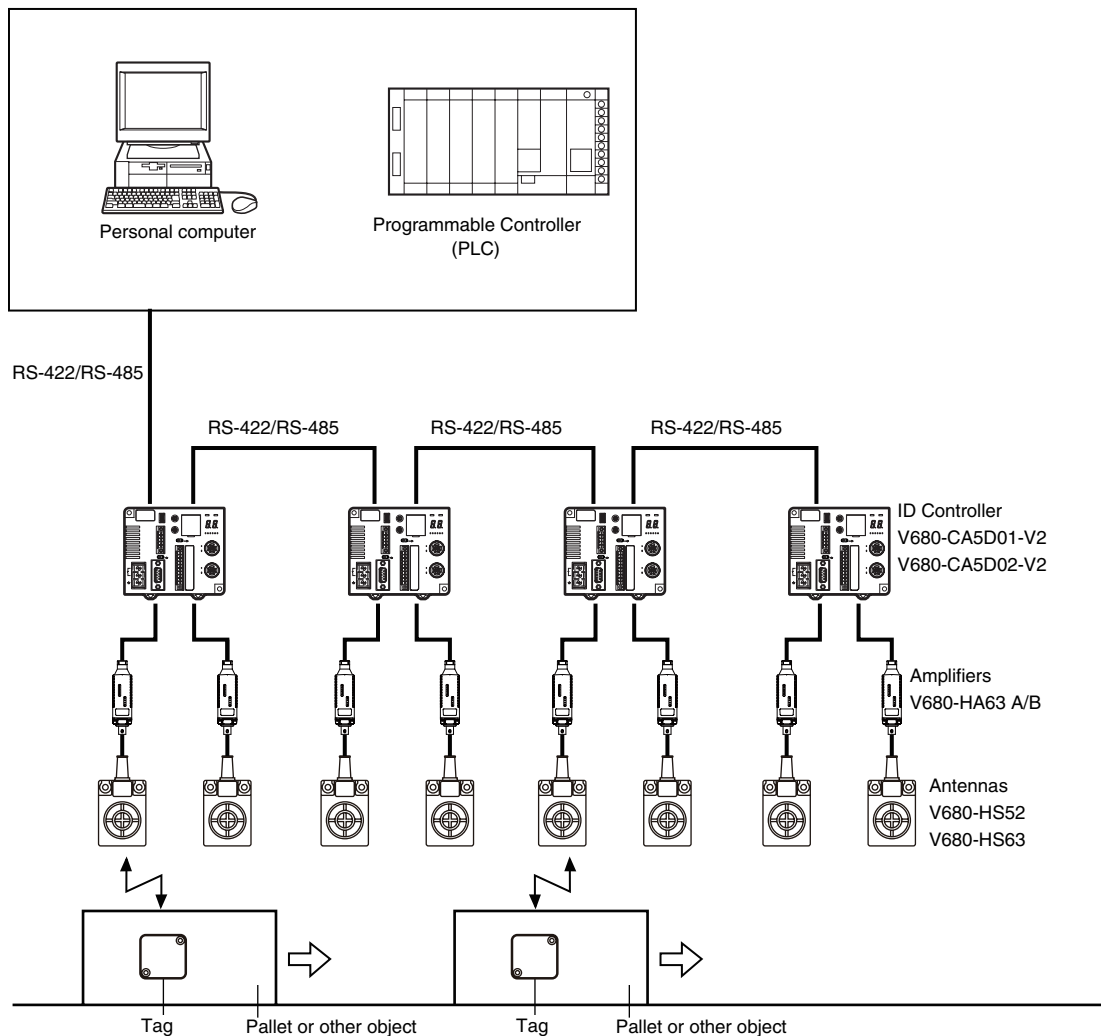Tag   Pallet or other object   Tag   Pallet or other object

CHECK!

The V680-H01 Antenna can be connected only to the V680-CA5D01-V2 ID Controller. It cannot be used with the V680-CA5D02-V2 ID Controller

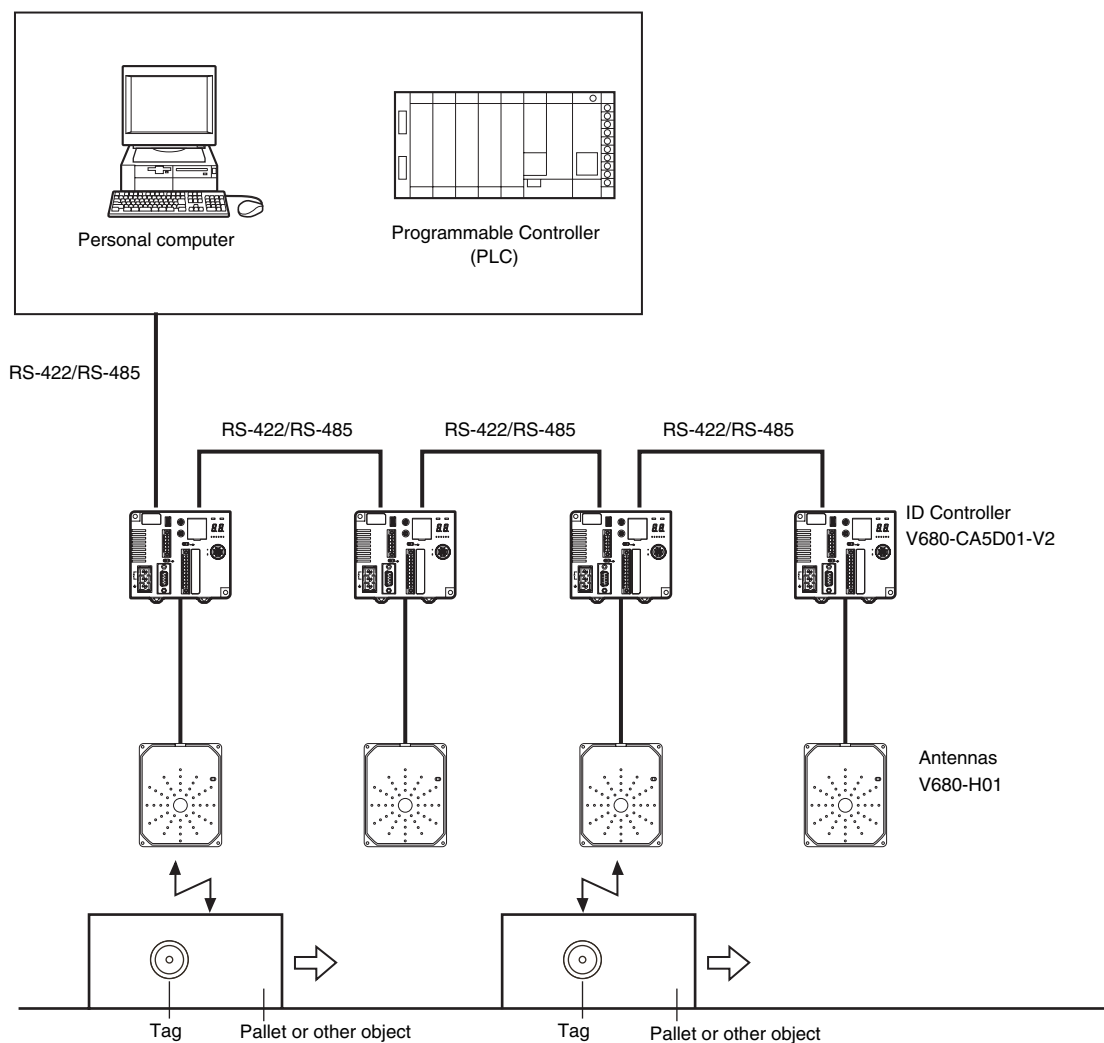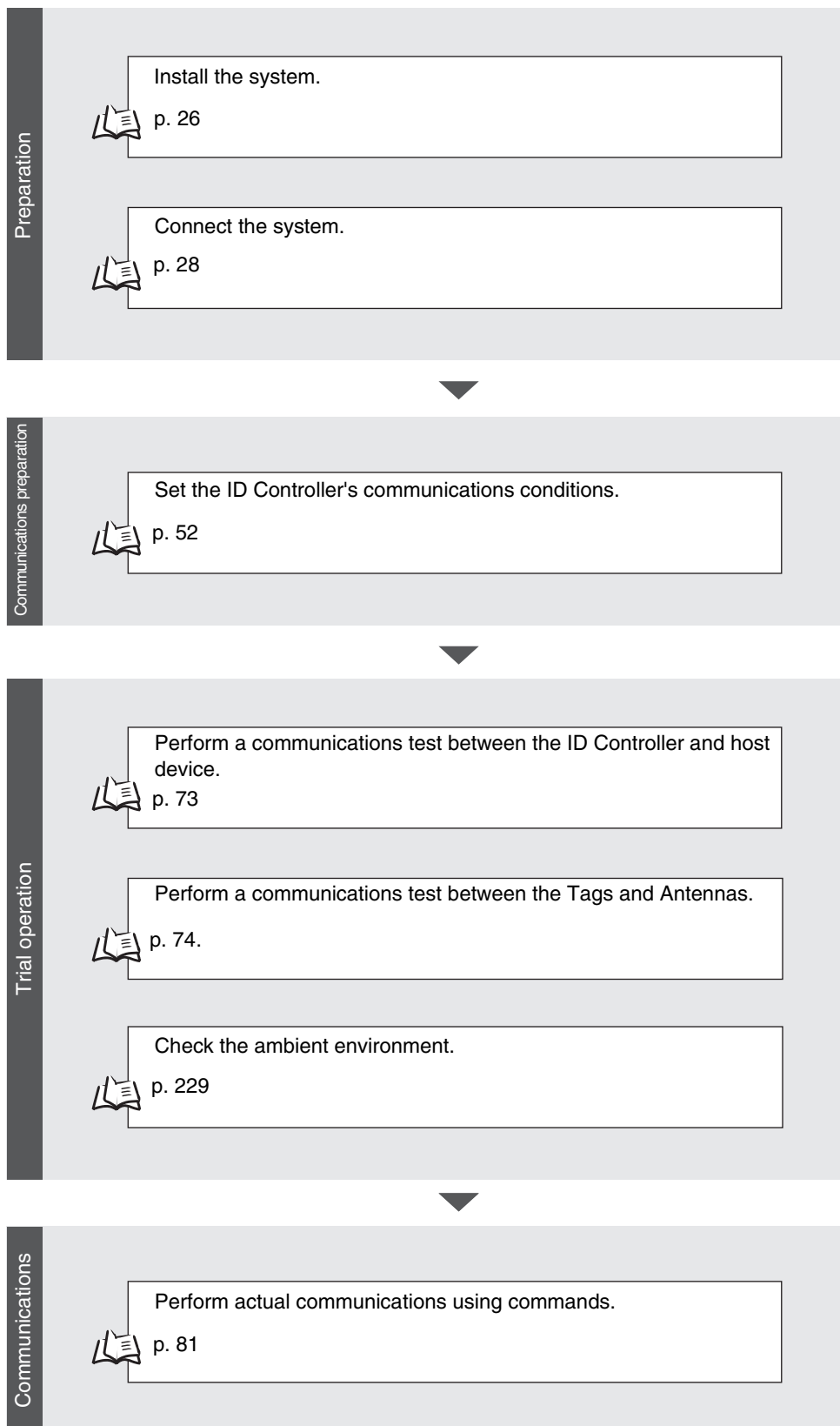# Application Flowchart

Preparation

Install the system.

p. 26

Connect the system.

p. 28

Communications preparation

Set the ID Controller's communications conditions.

p. 52

Trial operation

Perform a communications test between the ID Controller and host device.
p. 73

Perform a communications test between the Tags and Antennas.
p. 74.

Check the ambient environment.

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Communications

Perform actual communications using commands.

p. 81

MEMO

SECTION 2
Installation, Connections, and Wiring

Installation

To increase the reliability of the V680-CA5D01-V2 / -CA5D02-V2 ID Controllers and ensure full functionality, install the ID Controller according to the instructions provided in this section.

Installation Site

Do not install the ID Controller in the following locations.

- Locations exposed to ambient temperatures that are not between −10 and 55°C or where there are radical temperature changes resulting in condensation
- Locations exposed to humidity that is not between 25% and 85%
- Locations subject to corrosive gas, flammable gas, dust, salt, or metal powder
- Locations that will expose the ID Controller to direct vibration or shock
- Locations exposed to direct sunlight
- Locations exposed to spray of water, oil, or chemicals
- Locations more than 2,000 m above sea level

Mounting in a Panel

The ID Controller can be used at an ambient temperature range of −10 to 55°C. Be sure to observe the following precautions.
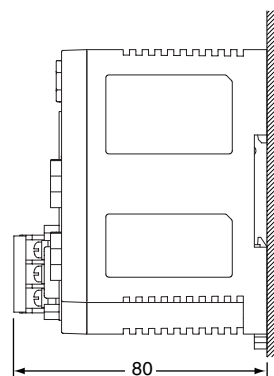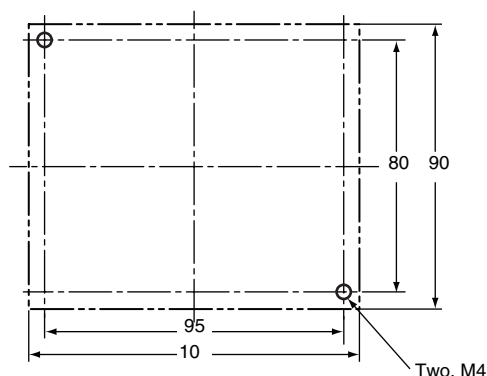
- Make sure that the ID Controller is provided with sufficient ventilation space.
- Do not install the ID Controller close to heaters, transformers, or large-capacity resistors that radiate excessive heat.
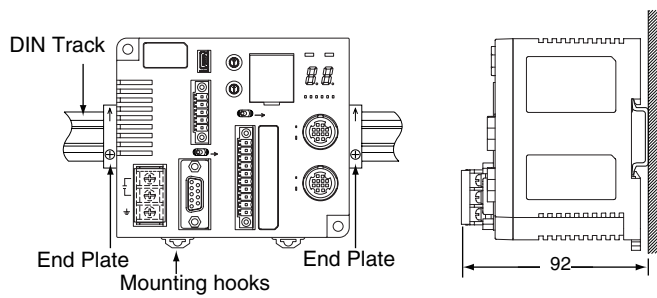
Installation Method

■ Mounting Directly in a Panel

Be sure to secure the ID Controller with two M4 screws together with spring washers and flat washers when enclosing the ID Controller in a panel.
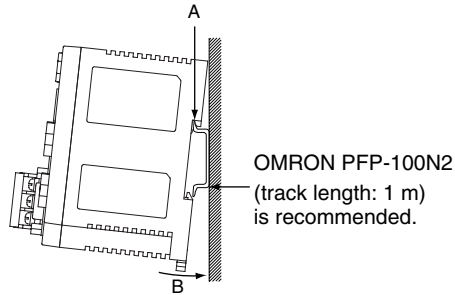
Recommended tightening torque: 1.2 N·m
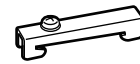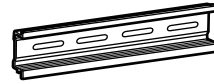
■ Mounting to a DIN Track

DIN Track

End Plate   End Plate

Mounting hooks

92

A

OMRON PFP-100N2
(track length: 1 m)
is recommended.

B

1) First hook the Controller to part A, and then
   press the Controller in direction B to mount the
   Controller to the DIN Track.
2) To disconnect the Controller from the DIN Track,
   pull the mounting hook downwards, and then lift
   the Controller upwards.

PFP-100N2
DIN Track

PFP-M
End Plate

CHECK!

Attaching the End Plates
To mount an End Plate easily, first hook the bottom of the End Plate and then hook the
top on the DIN Track, pull the End Plate downwards and tighten the screw.
Recommended tightening torque: 1.2 N·m.
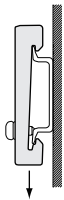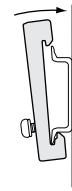
■ Mounting Interval

Leave a space of at least 10 mm between V680-CA5D01-V2/-CA5D02-V2 ID Controller. The ID Con-
trollers will generate heat if they are mounted side-by-side.

10 mm min.   10 mm min.

End Plate   Spacer   Spacer   End Plate
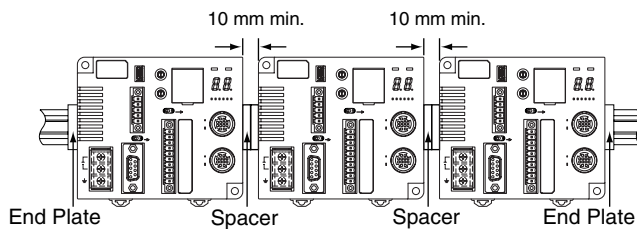
Use at least 2 OMRON DIN Track Spacers. (Each Spacer is 5 mm wide.)

PFP-S
Spacer
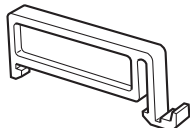
SECTION 2
Installation

Connection and Wiring

Power Supply and Ground Wires

The power supply and ground terminals use M3 self-rising screws. The following type of crimp terminals can be connected to these terminals.

Recommended tightening torque: 0.5 N·m

Examples of Applicable Crimp Terminals

Manufacturer	Model	Applicable wire	Type
J.S.T. Mfg. Co., Ltd.	1.25-N3A	0.25 to 1.65 mm² AWG22 to AWG16	Forked
	V1.25-N3A		
	1.25-MS3		Round
	V1.25-MS3		

6.4 max. (For M3 screw)

6.4 max.

• Provide 24 VDC to the Controller. The allowable fluctuation in the power supply is 24 VDC ($-15\%/+10\%$).

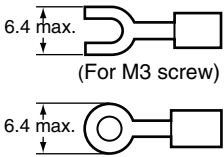• ID Controllers have built-in noise countermeasures against noise superimposed on the power supply line. Ground noise can be reduced further by attaching a filter to the power supply line.

• Twisted-pair wire is recommended for the power line.

• To increase resistance to noise, ground to 100 Ω or less to an independent ground pole.

• Use a class 2 power supply.

● Recommended Compact DC Power Supply (OMRON)

Model	Output capacity	Input voltage
S8VS-03024	24 VDC, 1.3 A	100 to 240 VAC

Note: The maximum power consumption of the Controller is 30 W (1.3 A at 24 VDC). The inrush current, however, must be considered when selecting the power supply capacity. A power supply with an output of 1.3 A min. at 24 VDC is recommended.

DC power supply

Line filter

+ 24V

0 V

Ferrite core

Ground to a resistance of 100 Ω or less
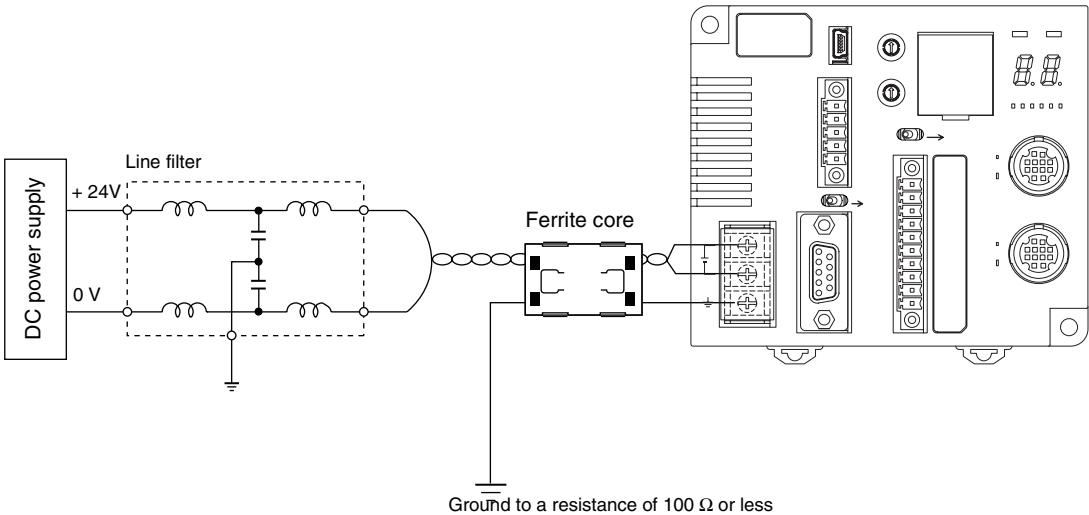
■ To reduce the influence of radiated noise, use a ferrite core.
Use the following procedure.

1. Wire the power supply and ground lines as normal.

▼

2. Wrap the power supply lines and ground line together around the ferrite core. Loop them around the ferrite core once so that the ferrite core does not move. The ferrite core should be within 10 cm of the ID Controller.

▼
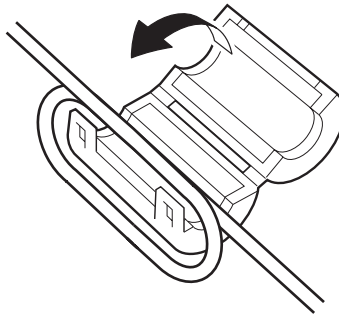
3. Close the ferrite core until you hear it click into place.

Ferrite core

SECTION 2 Connection and Wiring
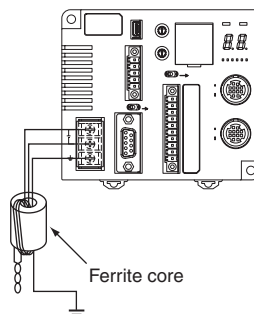
Wiring I/O Lines

■ Precautions for Reset Signal Input

• Be sure that the input voltage does not exceed the maximum applicable voltage (26.4 V).
  The device may malfunction if the rated voltage is exceeded.

• To improve noise resistance, install the input line 1 m or more away from high-voltage devices and
  power lines.
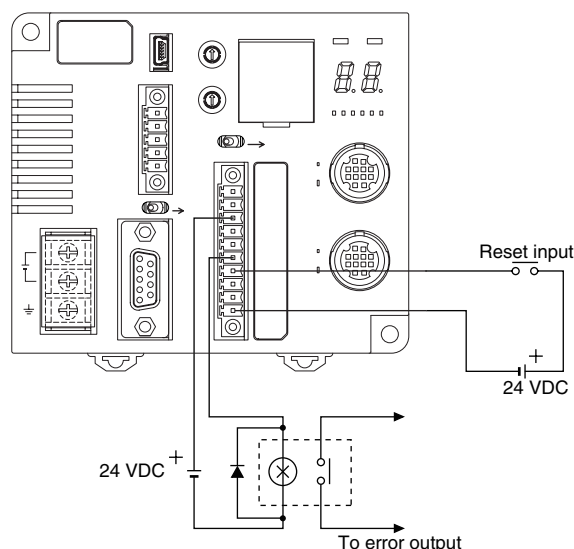
■ Precautions for Error Signal Output

• The maximum switching capacity for the output is 100 mA at 24 VDC (−15% to +10%).
  Do not use voltages or loads that exceed the switching capacity. Doing so may cause malfunctions.

• Use an auxiliary relay (24 VDC, 100 mA max.) to connect the output circuit.

■ Pin Arrangement

Pin No.	Name	
	V600 I/O	V680 I/O
1	RUN	
2	BUSY	OUT3
3	ERROR	OUT4
4	OUT1	
5	OUT2	
6	COM_O	
7	RST	
8	TRG1	
9	TRG2	
10	COM_I	

• Controller Terminal Arrangement

Terminal No.   1   2   3   4   5   6   7   8   9   10
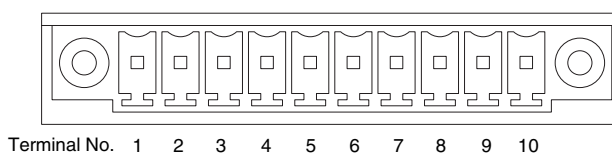
CHECK! Refer to *External I/O Port* for details on the external I/O port.

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■ Mounting Cables

Use the connectors provided with the ID Controller.

		Manufacturer	Model	Remarks
Cable	I/O lines	---	---	0.5 mm^2 (equivalent to AWG 20)
Connector		Phoenix Contact	MC1.5/10-STF-3.5	---
Crimp terminals	When connecting 1 line to each terminal		AI0.5-8WH	---
	When connecting 2 lines to each terminal		AI-TWIN2 × 0.5-8WH	---
Crimping Tool			CRIMPFOX UD6	---

1. Attach the crimp terminals to the sections of the cable where the sheath has been stripped.

2. Make sure the connector is facing the right direction and insert each crimp terminal into the correct connector hole.

Connector: MC1.5/10-STF-3.5
(manufactured by Phoenix Contact)

3. Firmly tighten the connector cable screws.
Recommended tightening torque: 0.22 N·m

CHECK! Use a small flat-blade screwdriver with a uniform thickness. Do not use a standard screwdriver with a tapered end. A standard screwdriver will not fully insert into the hole.

Small flat-blade screwdriver
with a tip of uniform thickness.

4. Once all of the cables have been connected to the connector, attach the connector to the ID Controller.

Align the cable connector with the connector on the ID Controller. Hold the connector body and push the connector firmly into place, and then tighten the connector lock screws.
Recommended tightening torque: 0.4 N·m

Lock screws

CHECK! Removing the Connector
Completely loosen the two lock screws, hold the protruding part of the connector, and pull straight out. If the connector is difficult to remove, press on the ID Controller while pulling on the connector.

CHECK! Do not connect cables to the connector after attaching the connector to the ID Controller.

RS-232C Port

■ Pin Arrangement

Pin No.	Symbol	Signal direction		Signal name
		Input	Output	
9	SG	---	---	Signal ground or common return line
2	SD	---	○	Send data
3	RD	○	---	Receive data
4	RS	---	○	Request to send
5	CS	○	---	Clear to send

• Controller Terminal Arrangement
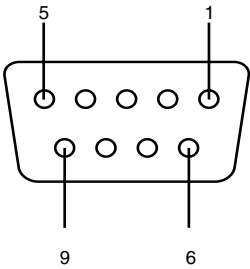
CHECK! The pin arrangement is different from that of the V680-CA1A. Use an RS-232C cable for the V680-CA5D@@-V2.

■ Connections to Host Device

▪ Example Connection to OMRON PLC

Host device   ID Controller

GR — GR
SG — SG
RD — SD
SD — RD
RS — RS
CS — CS
(Shield))
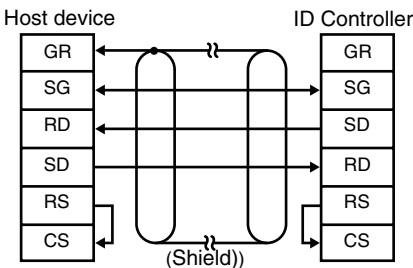
Recommended Cable

Model	Manufacturer
XW2Z-@@@T	OMRON

Note 1. Ground the shield at the host device side to prevent operation errors.

2. Short-circuit pins 4 (RS) and 5 (CS) inside the connector.

▪ Example Connection to IBM PC/AT or Compatible Computer via D-SUB 9-pin Connector

IBM PC/AT or compatible   ID Controller

GR — GR
SG — SG
RD — SD
SD — RD
RS — RS
CS — CS
(Shield)
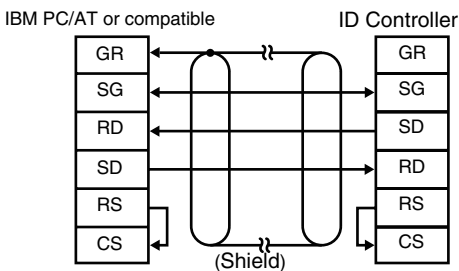
Recommended Cable

Model	Manufacturer
XW2Z-@@@S-V	OMRON

Note 1. The interface cable will have a male connector on the ID Controller and a female connector on the IBM PC/AT or compatible.

2. Ground the shield at the host device to prevent operation errors.

CHECK! Refer to *Connections between ID Controllers (1:N)* for information on 1:N connections.

▪ Connecting to Ethernet

The ID Controller can be connected to the host device through an OMRON ITNC-SGB01 Serial Gate Box to enable Ethernet TCP/IP communications. An ID Controller connected through a Serial Gate Box can be communicated with in exactly the same way as when the ID Controller is connected through the serial interface.
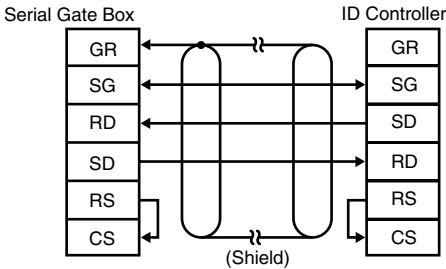
Model	Rated power supply voltage	Power consumption
ITNC-SGB01	DC24V +10% −15%	3 W max.

CHECK! Refer to the ITNC-SGB01 Serial Gate Box manual for details on the Serial Gate Box.

1:1 Connection
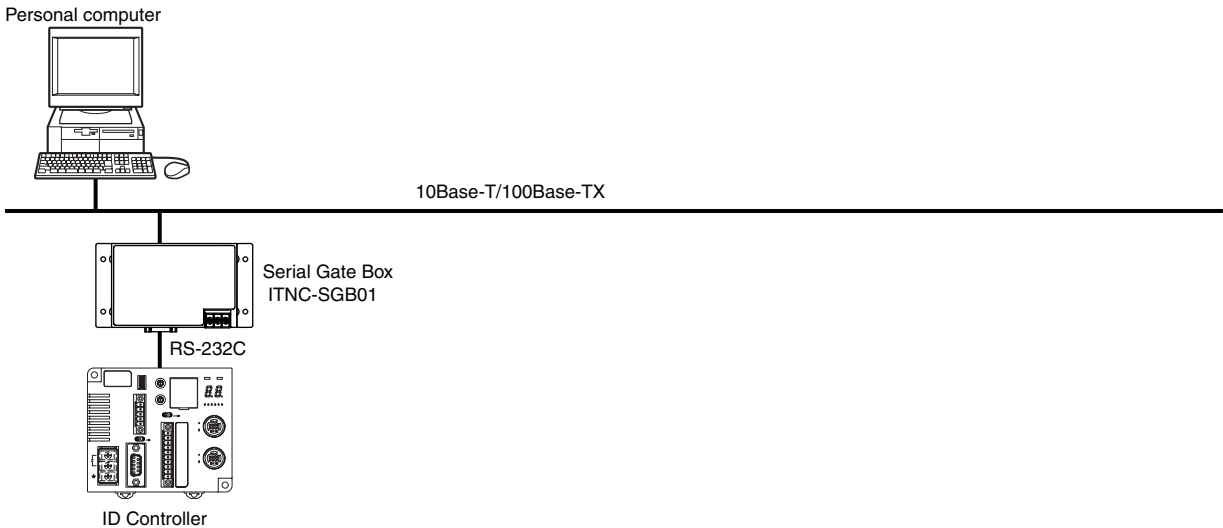
1:N Connections
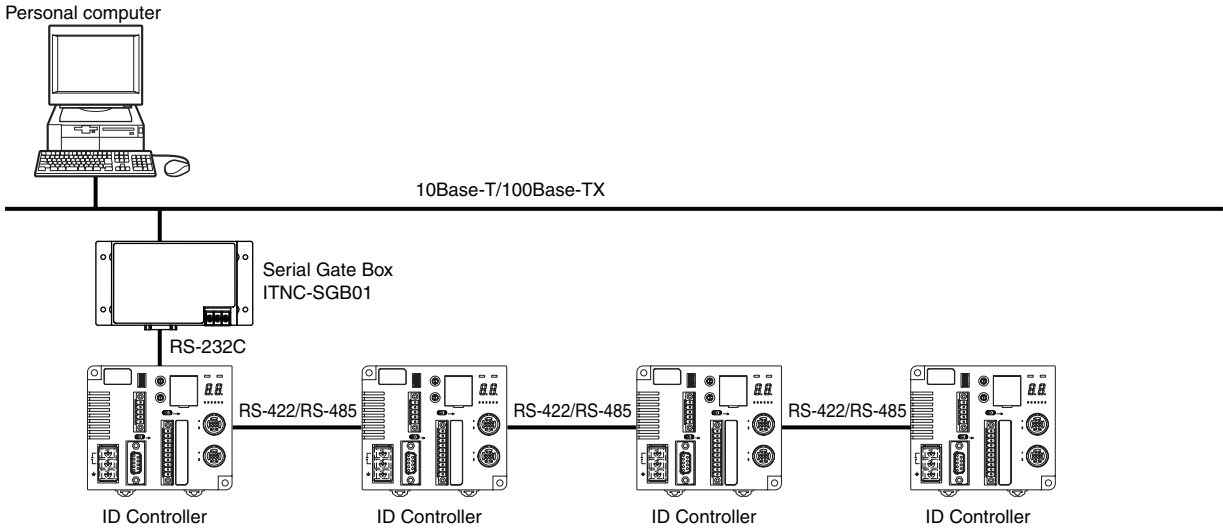
■ Assembling and Connecting the Communications Connector

Have a connection cable and connector ready.

Controller end

Host device end

OMRON
XM3B-0922-111
Plug

OMRON
XM2S-0911
Hood
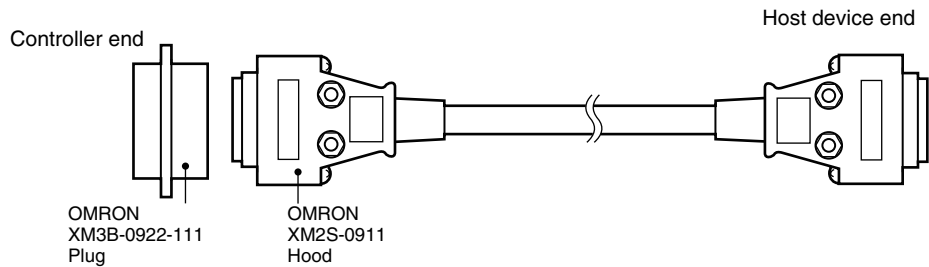
▪ Assembling the Connector

1. Prepare the end of the cable as shown below.

40

35

5

Conductors

Braided shield

Shield tape

10±1

12
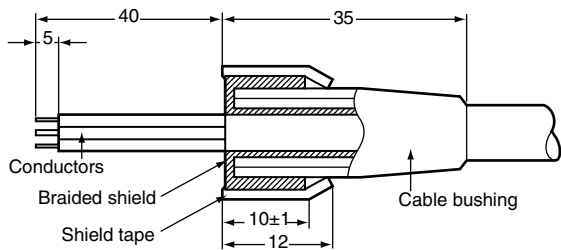
Cable bushing

- Insert the cable into the cable bushing.
- Unravel the braided shield for approximately 10 mm and fold it back on the cable bushing.
- Apply shield tape to the folded braided shield.

2. Solder the conductors to the plug pins.

Plug   Jumper

Aluminum
tape

Cable bushing
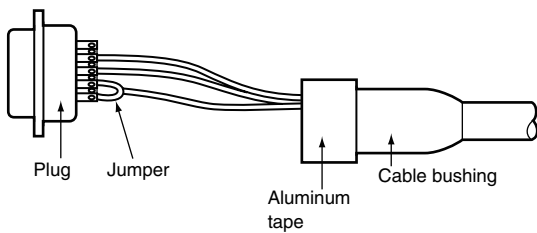
Pin No.	Symbol	Signal name
9	SG	Signal ground
2	SD	Send data
3	RD	Receive data
4 (See note.)	RS	Request to send
5 (See note.)	CS	Clear to send

Note: Short-circuit pins 4 (RS) and 5 (CS) with a jumper.

3. Attach housing A2 of the Hood to the Plug and secure the aluminum-taped portion with the cable clamp.

Two, M2.6 lock screws

Housing A2

Cable clamp
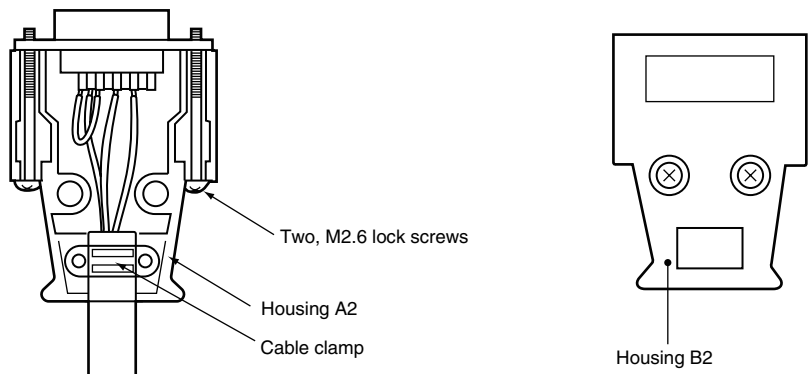
Housing B2

4. Secure the two connector lock screws and put on housing B2 to complete the connector.

§ Connecting and Disconnecting the Connector

- When connecting the connector, be sure to hold the connector by hand and fully insert the connector. Secure the connector by tightening the two lock screws with a Phillips screwdriver.
  Recommended tightening torque: 0.3 N·m
- When disconnecting the connector, completely loosen the two lock screws. Hold the protruding part of the connector hood by hand and pull the connector straight out. If the connector is difficult to disconnect, hold the ID Controller with your hand while pulling on the connector.

Lock screws
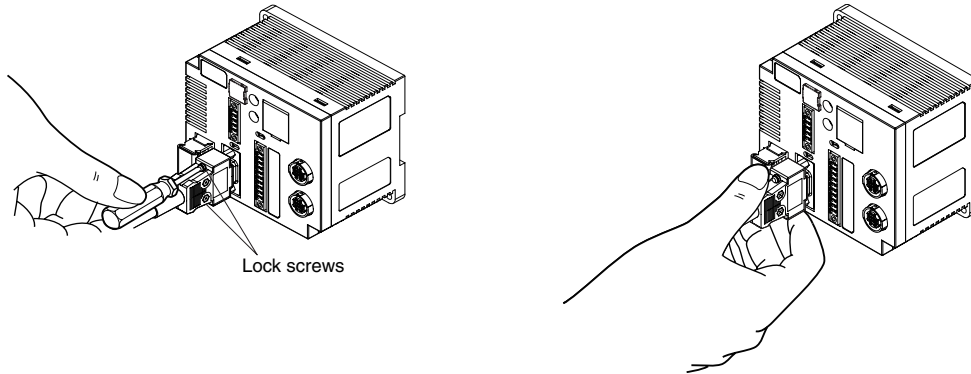
RS-422/RS-485 Port

■ Pin Arrangement

Pin No.	Name	Details
1	RDA(−)	Receive data
2	RDB(+)	Receive data
3	SDA(−)	Send data
4	SDB(+)	Send data
5	SG	SG

Note: The port can be used as an RS-485 port if terminals 1 and 3, and 2 and 4 are short-circuited.

• Controller Terminal Arrangement

Terminal No.   1   2   3   4   5
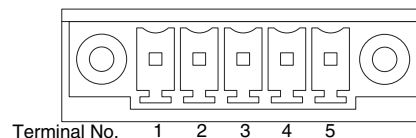
■ Connections to Host Device

▪ RS-422 Connections

Host device   (Shield)   ID Controller

Host device		ID Controller
RDA		RDA
RDB		RDB
SD		SDA
SDB		SDB
SG		SG
GR		
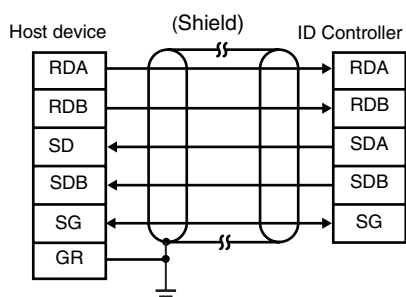
Note: Ground the shield at the host device to prevent operation errors.

▪ RS-485 Connections

Host device

ID Controller

RDA
RDB
SDA
SDB
SG

−
+
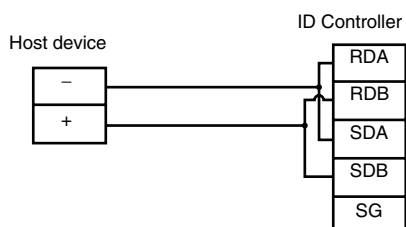
Note: Short-circuit terminals 1 and 3, and 2 and 4. Do not connect anything to the ID Controller signal ground.

RDA   RDB   SDA   SDB   SG

Reception terminating resistance

Transmission terminating resistance
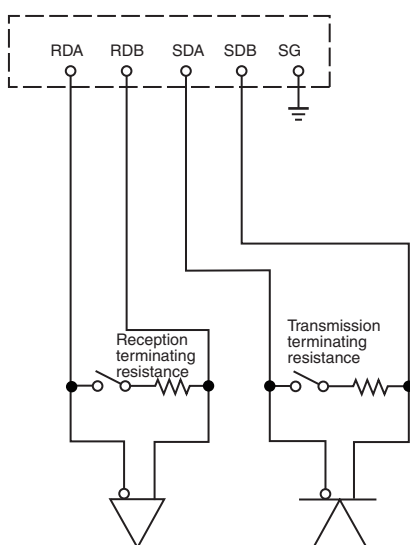
<u>**Terminating resistance: 220 (Ω) for RS-422, 110 (Ω) for RS-485**</u>

Note: Turn ON terminating resistance only at the ID Controllers at the both ends of the trunk cable. Turn OFF the terminating resistance at all ID Controllers in between. Normal transmissions will not be possible if terminating resistance is turned ON for the ID Controllers in between.

■ Connections between ID Controllers (1:N)

▪ RS-232C Connection to the Host Device
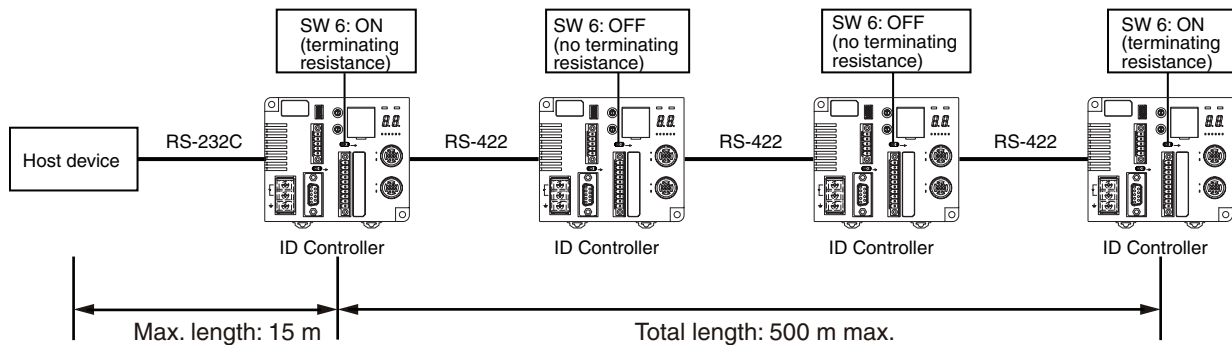
Pin No.	Symbol		Pin No.	Symbol		Pin No.	Symbol		Pin No.	Symbol
1	RDA		1	RDA		1	RDA		1	RDA
2	RDB		2	RDB		2	RDB		2	RDB
3	SDA		3	SDA		3	SDA		3	SDA
4	SDB		4	SDB		4	SDB		4	SDB
5	SG		5	SG		5	SG		5	SG

Pin No.	Symbol		Pin No.	Symbol		Pin No.	Symbol		Pin No.	Symbol
1	RDA		1	RDA		1	RDA		1	RDA
2	RDB		2	RDB		2	RDB		2	RDB
3	SDA		3	SDA		3	SDA		3	SDA
4	SDB		4	SDB		4	SDB		4	SDB
5	SG		5	SG		5	SG		5	SG

Note: Short-circuit terminals 1 and 3, and 2 and 4 to use RS-485 communication.

CHECK!

Refer to *Connections to Host Device* for information on RS-232C connections between the host device and ID Controllers.

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CHECK!

If the first communications received by an ID Controller are via the RS-232C interface, reception of RS-422/RS-485 communications will be prohibited. If the first communications are received via RS-422/RS-485, reception of RS-232C communications will be prohibited. Therefore, when changing the system configuration of an ID Controller, always turn OFF the power supply before changing the connections.

▪ **RS-422 Connection to Host Device**

| SW 6: OFF (no terminating resistance) | SW 6: OFF (no terminating resistance) | SW 6: OFF (no terminating resistance) | SW 6: ON (terminating resistance) |

Host device (terminating resistance connected) — RS-422 — ID Controller — RS-422 — ID Controller — RS-422 — ID Controller — RS-422 — ID Controller

Total length: 500 m max.

Pin No.	Symbol		Pin No.	Symbol		Pin No.	Symbol		Pin No.	Symbol
1	RDA		1	RDA		1	RDA		1	RDA
2	RDB		2	RDB		2	RDB		2	RDB
3	SDA		3	SDA		3	SDA		3	SDA
4	SDB		4	SDB		4	SDB		4	SDB
5	SG		5	SG		5	SG		5	SG

CHECK! Refer to *RS-422 Connections* for information on RS-422 connections between the host device and ID Controllers.
p. 36

CHECK! If the first communications received by an ID Controller are via the RS-232C interface, reception of RS-422/RS-485 communications will be prohibited. If the first communications are received via RS-422/RS-485, reception of RS-232C communications will be prohibited. Therefore, when changing the system configuration of an ID Controller, always turn OFF the power supply before changing the connections.

▪ **RS-485 Connection to the Host Device**

| SW 6: OFF (no terminating resistance) | SW 6: OFF (no terminating resistance) | SW 6: OFF (no terminating resistance) | SW 6: ON (terminating resistance) |

Host device (terminating resistance connected) — RS-485 — ID Controller — RS-485 — ID Controller — RS-485 — ID Controller — RS-485 — ID Controller

Total length: 500 m max.

Pin No.	Symbol		Pin No.	Symbol		Pin No.	Symbol		Pin No.	Symbol
1	RDA		1	RDA		1	RDA		1	RDA
2	RDB		2	RDB		2	RDB		2	RDB
3	SDA		3	SDA		3	SDA		3	SDA
4	SDB		4	SDB		4	SDB		4	SDB
5	SG		5	SG		5	SG		5	SG

Note: Short-circuit terminals 1 and 3, and 2 and 4 to use RS-485 communications.

CHECK! Refer to *RS-485 Connections* for information on RS-485 connections between the host device and ID Controllers.
p. 36

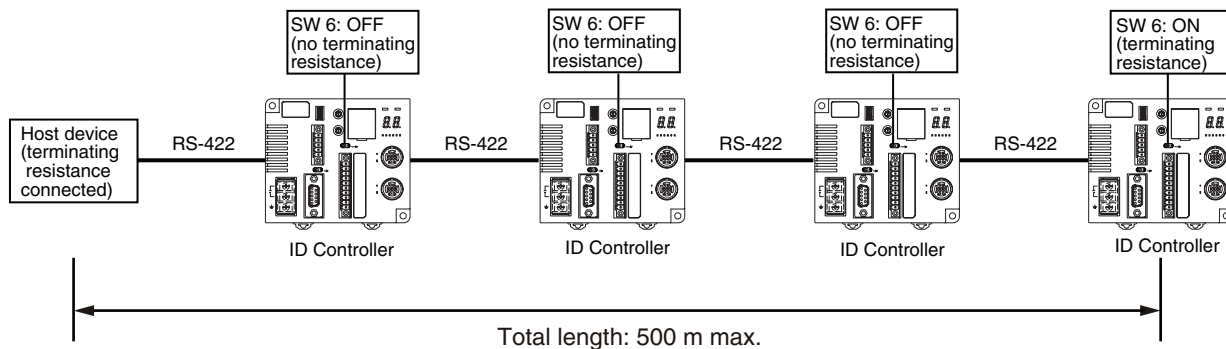**CHECK!** If the first communications received by an ID Controller are via the RS-232C interface, reception of RS-422/RS-485 communications will be prohibited. If the first communications are received via RS-422/RS-485, reception of RS-232C communications will be prohibited. Therefore, when changing the system configuration of an ID Controller, always turn OFF the power supply before changing the connections.

■ Mounting Cables

Use the connectors provided with the ID Controller.

		Manufacturer	Model	Remarks
Cable	RS-422 lines	---	---	0.5 mm^2 (equivalent to AWG 20)
Connector			MC1.5/5-STF-3.5	---
Crimp terminals	When connecting 1 line to each terminal	Phoenix Contact	AI0.5-8WH	---
	When connecting 2 lines to each terminal		AI-TWIN2 × 0.5-8WH	---
Crimping Tool			CRIMPFOX UD6	---

1. Attach the crimp terminals to the sections of the cable where the sheath has been stripped.

2. Make sure the connector is facing the right direction and insert each crimp terminal into the correct connector hole.

Connector: MC1.5/5-STF-3.5
(manufactured by Phoenix Connector)

3. Firmly tighten the connector cable screws.

Recommended tightening torque: 0.22 N·m

CHECK! Use a small flat-blade screwdriver with a uniform thickness. Do not use a standard screwdriver with a tapered end. A standard screwdriver will not fully insert into the hole.

Small flat-blade screwdriver with a tip of uniform thickness.

4. Once all of the cables have been connected to the connector, attach the connector to the ID Controller.

Align the cable connector with the connector on the ID Controller. Hold the connector body and push the connector firmly into place, and then tighten the connector lock screws.
Recommended tightening torque: 0.4 N·m

Lock screws

CHECK! Removing the Connector
Completely loosen the two lock screws, hold the protruding part of the connector, and pull straight out. If the connector is difficult to remove, press on the ID Controller while pulling on the connector.

CHECK! Do not connect cables to the connector after attaching the connector to the ID Controller.

USB Port

The USB port is connected to a USB cable (Series A-Mini USB series B connectors).

CHECK! The USB port is not a control port. Always use the RS-232C port or RS-422/RS-485 port for system configuration.
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■ Pin Arrangement

Pin No.	Name	Description
1	VBUS	Power supply
2	D−	USB data (−)
3	D+	USB data (+)
5	GND	Ground

• Controller Terminal Arrangement

Terminal   1 2 3 4 5

Pin No.	Symbol		Pin No.	Symbol
1	VBUS	→	1	VBUS
2	D −	↔	2	D −
3	D +	↔	3	D +
4	GND	↔	5	GND
-	GR	↔	-	GR
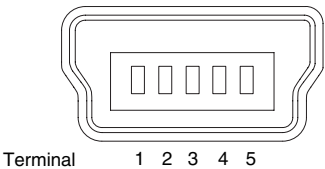
■ Connecting and Disconnecting Connectors

1. Connect the Mini USB series B end of the connector to the ID Controller.

Series B end   Series A end
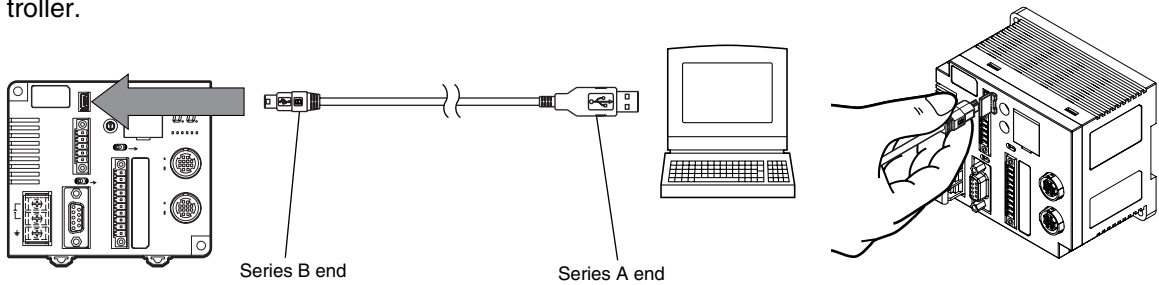
CHECK! A cap is attached to the connectors at shipment. Leave this cap on if USB is not being used to prevent dust or foreign matter from entering the connectors and to prevent static electricity.

CHECK! Removing Connectors
Hold the base of the connector and pull straight out. If the connector is difficult to remove, press the ID Controller while pulling on the connector.

2. Connect the Series A end of the connector to the host device.

Align the connectors and insert the connector straight in.

▼
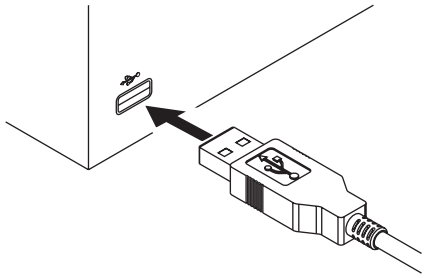
3. Removing the Connector from the Host Device

Close the software on the host device and pull the connector straight out.

CHECK! If the connector is removed while the software is running on the host device, the software will not operate properly, which will cause a fatal error.
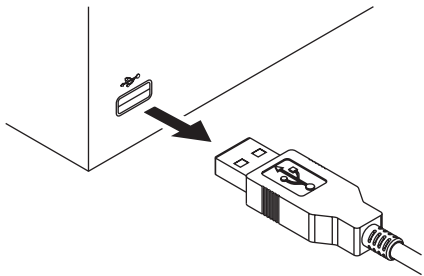
■ Installing Ferrite Cores

Noise resistance may be low because USB is being used.

Noise resistance can be improved by using the ferrite core listed below.

Manufacturer	Model
SEIWA	E04SR301334

1. Install the ferrite core listed above to the cable.

Attach the ferrite core to the Mini USB Series B end. Close the ferrite core until it snaps shut. The ferrite core should be 10 cm or less from the connector.

10 cm max.
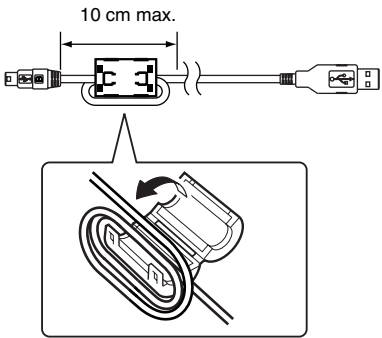
■ Installing the USB Driver

When connecting the ID Controller to the host device for the first time, the USB driver must be installed on the computer.

▪ Downloading the USB Driver

Download the USB driver for the V680-CA5D01-V2 or V680-CA5D02-V2.

For details, ask your OMRON representative for information on the USB driver.

▪ Installing the USB Driver on the Computers

The USB Driver can be used on Windows 2000 or XP. Install the driver on the host device following the procedure corresponding to the operating system being used.
Operation may not be possible on other operating systems.

Windows 2000

1. Turn ON the power to the computer and start Windows 2000.

▼

2. Connect the ID Controller to the computer via USB.

CHECK!   Refer to *USB Port* for information on the connection method.

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The following dialog box will be displayed when the ID Controller is connected via USB.

Found New Hardware

V680-CA5D

Installing ...

▼

3. Once the following dialog box has been displayed, click the **Next** Button.

Found New Hardware Wizard

Welcome to the Found New
Hardware Wizard

This wizard helps you install a device driver for a
hardware device.

To continue, click Next.

< Back   Next >   Cancel

▼

4. Select *Search for a suitable driver for my device (recommended)* and click the **Next** Button.

▼
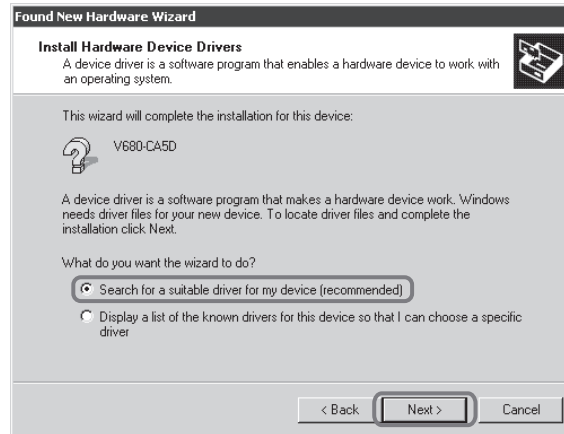
5. Select *Specify a location* and click the **Next** Button.

▼
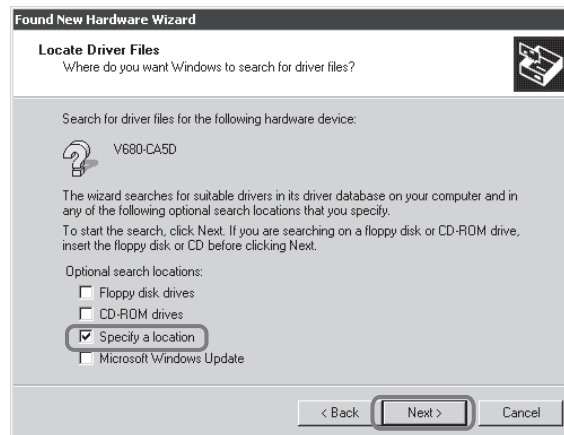
6. Click the **Browse** Button and select the folder where the downloaded V680-CA5D_100.inf is to be saved.

▼

SECTION 2   Connection and Wiring

7. Click the **Next** Button.
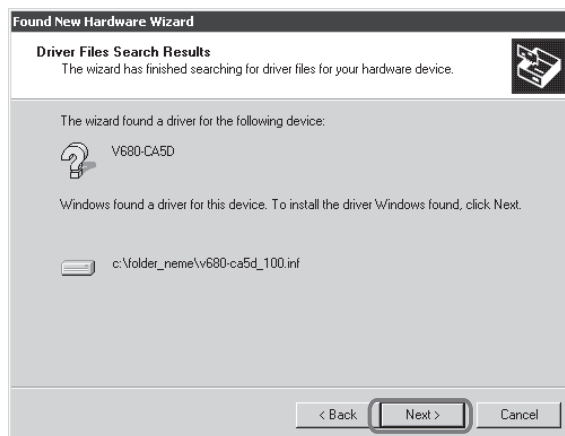
The following dialog box will be displayed when the software installation has been completed.

▼

8. Click the **Finish** Button.

§ Checking Installation

Use the following procedure to confirm that the driver has been correctly installed.

1. Connect the ID Controller to the computer via USB.

▼

2. Select **Settings - Control Panel - System** from the Windows Start Menu.

▼

3. Click the **Device Manager** Button on the Hardware Tab Page.

▼
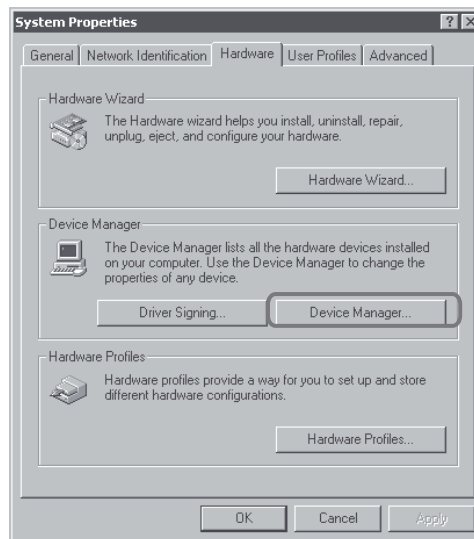
4. Select Ports (COM & LPT) and check that OMRON RFID USB COM is displayed.

If the driver is correctly installed the property window for the V680-CA5D@@-V2 will be as follows:
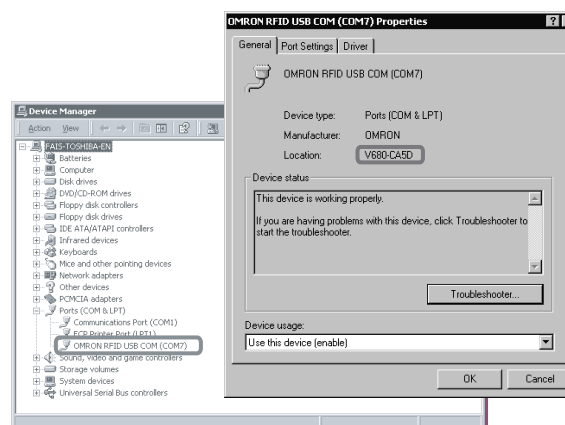
Communications with the ID Controller can be performed with the COM number displayed in parentheses after OMRON RFID USB COM.

Windows XP

1. Turn ON the power to the computer and start Windows XP.

▼

2. Connect the ID Controller to the computer via USB.

CHECK!   Refer to *USB Port* for details on the connection method.

Wait for the following dialog box to be displayed.

▼

3. When the following dialog box is displayed, select Install from a list or specific location (Advanced) and click the **Next** Button.

▼
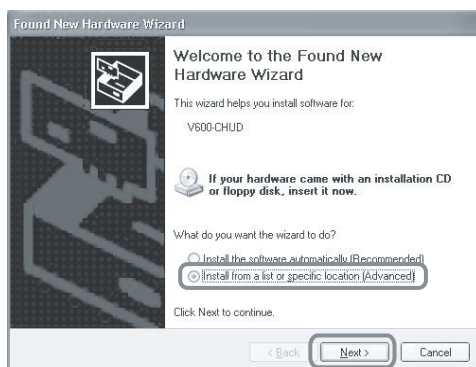
4. Click the **Browse** Button and select the folder in which the downloaded V680-CA5D_100.inf file is to be saved. Then click the **Next** Button.

▼
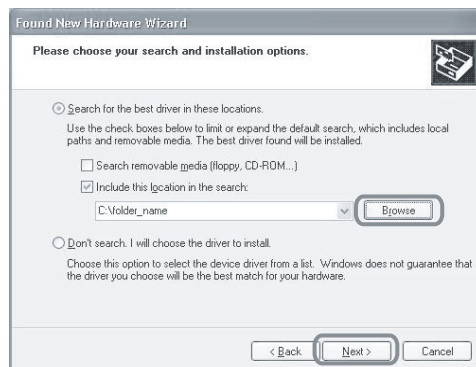
5. Click the **Continue** Button.
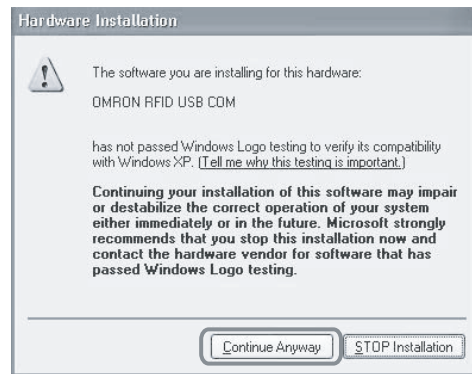
When the following dialog is displayed, installation is completed.
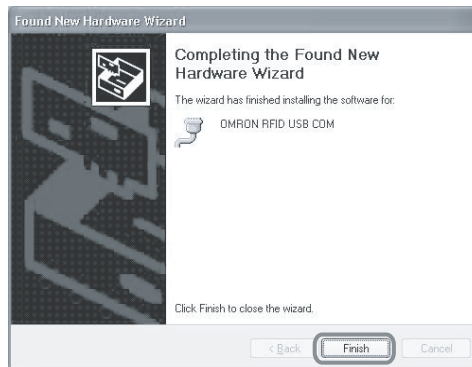
6. Click the **Finish** Button.

▪ Checking Installation

Use the following procedure to confirm that the driver has been correctly installed.

---

1. Connect the ID Controller to the computer via USB.

▼
2. Select *Control Panel - Performance and Maintenance* from the Windows Start Menu.

▼
3. Click the **System** Icon.

▼
4. Click the **Device Manager** Button on the Hardware Tab Page.
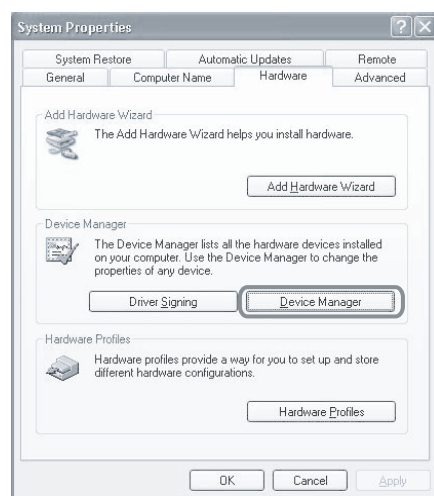
▼
5. Select Ports (COM & LPT) and check that OMRON RFID USB COM is displayed.

If the driver is correctly installed the property window for the V680-CA5D@@-V2 will be as follows:
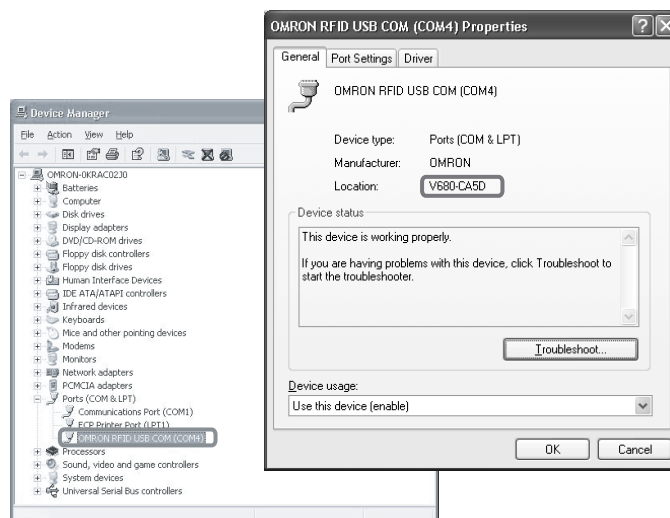
Communications with the ID Controller can be performed with the COM number displayed in parentheses after OMRON RFID USB COM.

Antenna Port

■ Connecting and Removing the Connector

---

1. Hold the base of the connector, and insert the connector while matching the white mark on the ID Controller with the white mark on the connector.

2. Press the connector in vertically until it locks.

> CHECK! Be sure to hold onto the base of the connector. The connector will not lock if the ring is held.

Ring
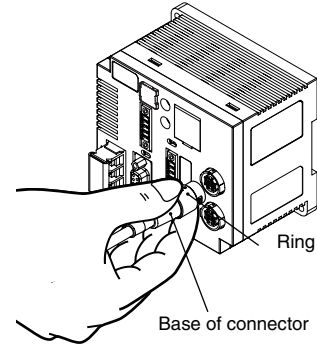
Base of connector

3. To remove the connector, hold onto the ring and pull the connector straight out.

> CHECK! The cable cannot be removed if the base of the connector is held. Never pull excessively on the cable. Doing so will cause broken wires and damage.
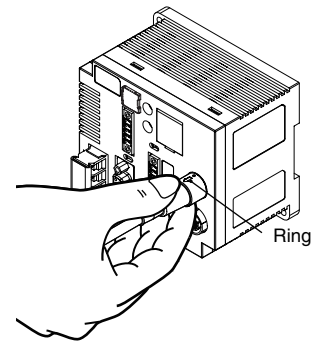
> CHECK! Do not remove or connect the connector when the power is turned ON. Doing so may cause malfunctions.

Ring

MEMO

SECTION 3
Preparations for Communications

Switch Settings

Opening the Cover

Open the cover by inserting a small screwdriver into the groove on the cover.

Controller Number Switches (SW1, SW2)

DIP Switch (SW3)

DIP Switch (SW4)

Mode Switch (SW5)

Terminating Resistance Switch (SW6)
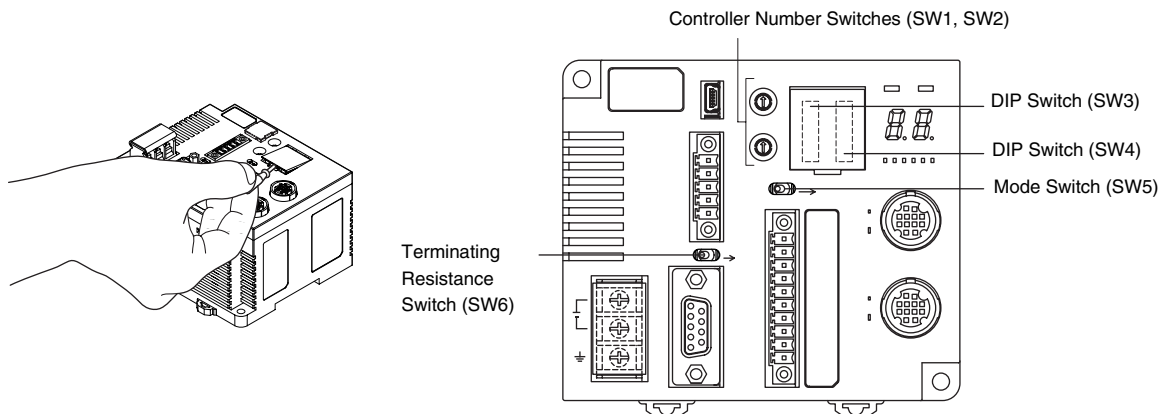
Setting Methods

Use the provided screwdriver to make switch settings as shown in the following diagram.

• Rotary Switch Settings (SW1, SW2)
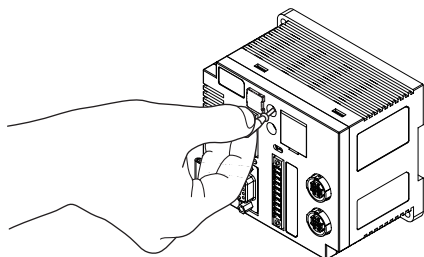
• DIP Switch Settings (SW3, SW4)
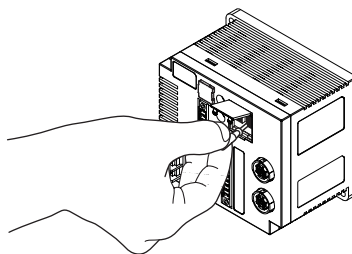
• Toggle Switch Settings (SW5, SW6)
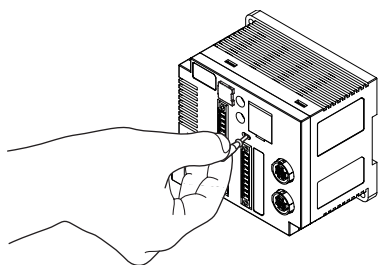
Default Settings

	Name	Default setting	Description	Reference
SW1	Controller number upper digit (0 to 9)	0	Controller No. 00	p. 54
SW2	Controller number lower digit (0 to 9)	0		
SW3, pin 1	SW enable switch	OFF	DIP Switches enabled	p. 55
SW3, pin 2	Reserved by system.	OFF	(Not used)	
SW3, pin 3	Baud rate setting 1	OFF	Baud rate: 9600 bps	
SW3, pin 4	Baud rate setting 2	OFF		
SW3, pin 5	Data length	OFF	Data length: 7 bits	
SW3, pin 6	Parity 1	OFF	Parity: Even	
SW3, pin 7	Parity 2	OFF		
SW3, pin 8	Stop bit length	OFF	Stop bits: 2	
SW3, pin 9	Communications protocol	OFF	1:1	
SW3, pin 10	Command system	OFF	V680 commands	
SW4, pin 1	Test Mode switch setting 1	OFF	Distance level measurement	p. 56
SW4, pin 2	Test Mode switch setting 2	OFF		
SW4, pin 3	Test Mode switch setting 3	OFF		
SW4, pin 4	Antenna specification for test execution	OFF	Antenna 1	
SW4, pin 5	Write verification	OFF	With write verification	
SW4, pin 6	Lower trigger execution setting	OFF	None	
SW4, pin 7	Write protection function disable	OFF	Enabled	
SW4, pin 8	V680-H01 Antenna connection setting	OFF	Connection to antennas other than the V680-H01	
SW4, pin 9	Run Mode setting	OFF	Command Execution Mode	
SW4, pin 10	High-speed Data Transmission setting	OFF	Normal mode	
SW5	Mode switch	OFF	Run Mode	p. 57
SW6	Terminating resistance	OFF	No terminating resistance	

■ Controller Number Switch Settings (SW1, SW2)

▫ Controller Numbers

If more than one Controller is connected to a single host device, the host device must be able to distinguish them. For this reason, a different Controller number must be set for each Controller.

Controller numbers are included in 1:N protocol commands and responses. Communications are not possible if the Controller numbers are not set correctly.

CHECK! SW1 and SW2 are enabled only when the DIP switch is enabled (i.e., when pin 1 on SW3 is OFF). If the internal settings are enabled (i.e., if pin 1 on SW3 is ON), the values specified by the PARAMETER SET (SP) command will be enabled.

▫ Setting Controller Numbers

SW1	SW2	Controller No.
Upper digit	Lower digit	
0	0	0
0	1	1
0	2	2
0	3	3
0	4	4
0	5	5
0	6	6
0	7	7
0	8	8
0	9	9
1	0	10
1	1	11
:	:	:
2	9	29
3	0	30
3	1	31
3	2	Setting prohibited
3	3	Setting prohibited
:	:	:
9	9	Setting prohibited

Setting Examples

SW1

SW2

Controller No. 0

SW1

SW2
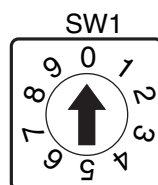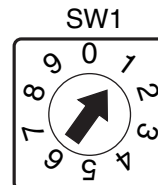
Controller No. 17

The Controller number switch is factory-set to 00.

CHECK! Do not set the Controller number switch to between 32 and 99.

CHECK! When rotary switch SW1 is set to 8, the ID Controller will be in Host Communications Trigger Send Mode. If the mode switch is turned OFF in this mode, a response frame will be sent to the host device.

■ DIP Switch Settings (SW3, SW4)

§ SW3, Pin 1 (SW Enable Switch)

SW3, pin 1	Description
OFF	DIP switch enabled
ON	Internal settings enabled

Note: SW1, SW2, SW3 (pins 3 to 9), and SW4 (pins 5 to 7) are enabled only when the DIP switches are enabled.

CHECK!

When the internal settings are enabled, the values specified by the TR and SP commands are valid.

The default values will be enabled if values have not been specified using the TR and SP commands.

§ SW3, Pin 2 (Reserved by System)

Do not use this pin. Always set this pin to OFF.

§ SW3, Pins 3 and 4 (Baud Rate)

SW3, pin 3	SW3, pin 4	Description
OFF	OFF	9,600 bps
	ON	19,200 bps
ON	OFF	38,400 bps
	ON	115,200 bps

§ SW3, Pin 5 (Data Length)

SW3, pin 5	Description
OFF	7 bits
ON	8 bits

§ SW3, Pins 6 and 7 (Parity)

SW3, pin 6	SW3, pin 7	Description
OFF	OFF	Even
	ON	None
ON	OFF	Odd
	ON	Even

§ SW3, Pin 8 (Stop Bit Length)

SW3, pin 8	Description
OFF	2 bits
ON	1 bit

§ SW3, Pin 9 (Communications Protocol)

SW3, pin 9	Description
OFF	1:1
ON	1:N

SECTION 3
Switch Settings

- SW3, Pin 10 (Command System)

SW3, pin 10	Description
OFF	V680 commands
ON	V600 commands

- SW4, Pins 1, 2, and 3 (Maintenance Mode Switch Settings)

SW4, pin 1	SW4, pin 2	SW4, pin 3	Description
OFF	OFF	OFF	Distance Level Measurement Mode
		ON	Tag Communications Test Mode
	ON	OFF	Speed Level Measurement Mode, Read
		ON	Speed Level Measurement Mode, Write
ON	OFF	OFF	Noise Level Measurement Mode
	ON	OFF	Communications Success Rate Measurement Mode
		ON	Host Communications Monitor Mode

CHECK!   Maintenance Mode cannot be used when the V680-H01 Antenna is connected.

CHECK!   For details, refer to *Maintenance Mode*.

- SW4, Pin 4 (Antenna Specification)

SW4, pin 4	Description
OFF	Antenna 1
ON	Antenna 2

Note: This setting is valid only in Maintenance Mode.

- SW4, Pin 5 (Write Verification)

SW4, pin 5	Description
OFF	With write verification
ON	Without write verification

- SW4, Pin 6 (Lower Trigger Execution)

SW4, pin 6	Description
OFF	None
ON	Enabled (on rising edge)

Note: This setting is valid only when pin 10 on DIP switch SW3 (command system) is ON.

- SW4, Pin 7 (Write Protection Function)

SW4, pin 7	Description
OFF	Enabled
ON	Disabled

SW4, pin 8 (V680-H01 Antenna connection setting)

SW4, pin 8	Description
OFF	Connection to antennas other than the V680-H01
ON	Allows connection of the V680-H01 Antenna.

CHECK! The V680-H01 Antenna can be connected only to the V680-CA5D01-V2 ID Controller. It cannot be used with the V680-CA5D02-V2 ID Controller.

SW4, Pin 9 (Run Mode)

SW4, pin 9	Description
OFF	Command Execution Mode
ON	Self-execution Mode

CHECK! Self-execution Mode will not work if pin 10 on DIP switch SW3 (command system) is ON.

SW4-10 (High-speed Data Transmission setting)

SW4, pin 8	Description
OFF	Normal mode
ON	High-speed mode

CHECK! The high-speed mode cannot be used with the V680-H01 Antenna.

CHECK! For information on communication times, refer to *Tag Communications Time and Turn Around Time (Reference)*. When using multi-access, selective, or FIFO communications options, normal-mode communications speed will be used regardless of this setting.

■ Mode Switch Setting

SW5	Description
OFF	Run Mode
ON	Maintenance Mode

CHECK! Maintenance Mode cannot be used when the V680-H01 Antenna is connected.

■ Terminating Resistance

If two or more ID Controller are connected to one host device, be sure to turn ON the terminating resistance of only the Controllers or host devices at each end of the serial connection and turn OFF the terminating resistance of any other device. Incorrect settings will result in unstable operation.
This switch is used to set internal terminating resistance.

SW6	Description
OFF	Terminating resistance OFF
ON	Terminating resistance ON

Operation Modes

The V680-CA5D01/02 ID Controller has two operation modes: Run Mode and Maintenance Mode.

■ Run Mode

There are two Run Modes: Command Execution Mode and Self-execution Mode.

The Run Mode at startup (when the power is turned ON) can be selected using pin 9 on SW4. The mode can also be changed by executing an OPERATION MODE CHANGE command (MO) from the host device.
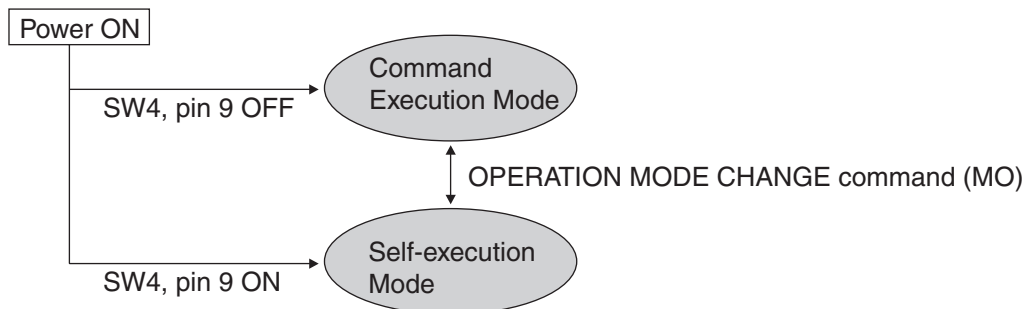
▪ Command Execution Mode

In this mode, commands are executed from the host device to perform operations and the results are returned to the host device as responses.
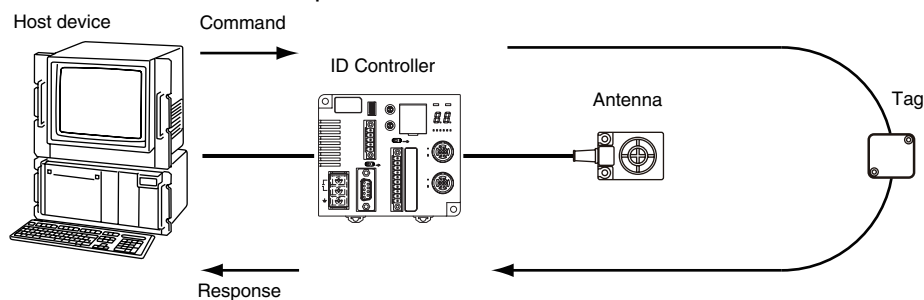
■ Self-execution Mode

CHECK! The operation conditions must be registered in Command Execution Mode using the OPERATION CONDITION SET (SE) command.

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Self-completion operation can be performed so that communications with Tags are automatically executed according to the operation conditions registered in the ID Controller, the results of communications with the Tags are judged (judgment conditions), and the results are output to the four external outputs (OUT1, OUT2, OUT3, and OUT4) or the RS-232C port. A very simple system can be built because the ID Controller does not need to be controlled from the host device.
The following operation conditions can be registered.

Item	Settings
Execution processing	Only Tag communications commands can be used. The only RA and RI communications modes can be used.
Judgment conditions	One of the following can be set for each output. 1) Output judgment of Tag communications results. 2) Output results of comparing response data to set data.
Result output	The following five outputs can be set for when judgement conditions have been met. (See note.) Judgement conditions can be set for each output. 1) Output to OUT1. The output time can be set. 2) Output to OUT2. The output time can be set. 3) Output to OUT3. The output time can be set. 4) Output to OUT4. The output time can be set. 5) Return the response to the host computer.

Note: There are 2 external outputs (OUT1 and OUT2) if the I/O arrangement is set to the same I/O arrangement as the V600(V680-CA5D@@-V2).

CHECK! Self-execution Mode will not work if the V600 command system is set. For the V680 command system, either 2 outputs (default setting of 0) or 4 outputs can be switched. Refer to *PARAMETER SET (SP)* for details.

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CHECK! The operation conditions are stored in the ID Controller's internal non-volatile memory and do not need to be set again each time the power is turned ON.

SECTION 3
Switch Settings

■ **Maintenance Mode**

Maintenance Mode is used to perform tests corresponding to actual operation. Maintenance Mode can be used to simply measure the communications performance in a particular environment, making it useful for checking during system installation and operation.

The following five modes are available within Maintenance Modes.

Mode	Description
Distance Level Measurement Mode	Measures the Antenna and Tag installation distance in relation to the Tag communications range and displays the result on the bar indicator.
Tag Communications Test Mode	Communications with Tags and displays the end code on the monitor display to indicate the result.
Speed Level Measurement Mode	Measures the number of times that communications can be performed consecutively based on the speed Tags pass through the Antenna communications range and displays the result as a speed level on the bar indicator and monitor display.
Noise Level Measurement Mode	Measures the ambient noise level in the installation environment and displays the result on the monitor display.
Communications Success Rate Measurement Mode	Executes communications with a Tag 100 times with no retries and displays the result as a communications success rate on the monitor display.
Host Communications Monitor Mode	Outputs the communications commands and responses exchanged with the host device from the USB port.

CHECK!
Maintenance Mode cannot be used when the V680-H01 Antenna is connected.
Regardless of the mode setting, the Unit will operate in Tag Communications Test Mode.

▪ **Using Maintenance Mode**

1. Set Test Mode.

Set pins 1 to 3 on DIP switch SW4 to the Test Mode to be used.

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▼
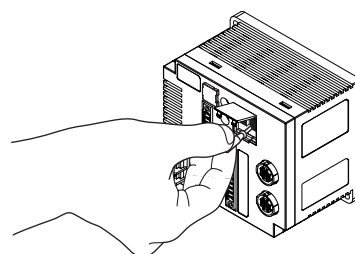
2. Set the Mode Switch (SW5).

Turn ON the power and turn ON the mode switch (SW5) to change to Mainte-nance Mode.

CHECK!
If the power is turned ON with the mode switch (SW5) already set to ON, the Controller will enter Maintenance Mode.
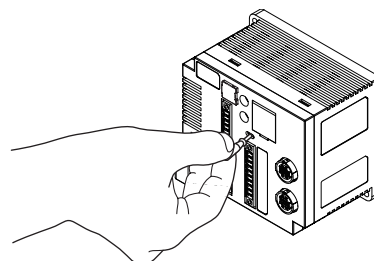
CHECK!
If the power supply is turned ON with the mode switch (SW5) turned ON, the ID Controller will start in Maintenance Mode. If Maintenance Mode is entered during command execution (other than in Host Communications Monitor Mode), all current processing will be canceled. If a write command was being executed, part of the contents of the Tag may have been overwritten.

CHECK!
To switch to another mode, change the Test Mode on pins 1 to 3 on DIP switch SW4 then turn ON the mode switch (SW5).

▪ Distance Level Measurement Mode

Distance Level Measurement Mode can be used to easily check the installation positions of Antennas and Tags without connecting to a host device. In this mode, the monitor display and bar indicator show how far the installation distance between Antenna and Tags is in relation to the communications range.

CHECK! The distance level changes dramatically depending on the ambient environment. Use it as a guide for the installation position and perform sufficient tests in Run Mode in the actual installation environment. Levels higher than distance level 4 may not be displayed, but this does not indicate an error and performance in Run Mode will not be affected.

SECTION 3 Switch Settings

1. Change to Distance Level Measurement Mode.
SW4, pin 1: OFF, SW4, pin 2: OFF, SW4, pin 3: OFF, SW5: ON

▼
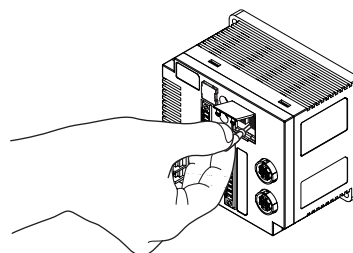
2. Place Tags within the Antenna communications range.

Distance level 1
Tag 2
3
4
5
6
Antenna

▼
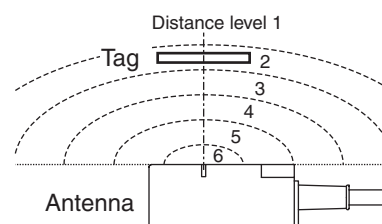
3. The distance level will be displayed on the bar indicator and monitor display.
The level at which normal reading was possible will be displayed between 01 and 06. If there is no Tag in the Antenna's communications area, "--" will be displayed. The measurement result is also output from the USB port.

Monitor display
Bar indicator
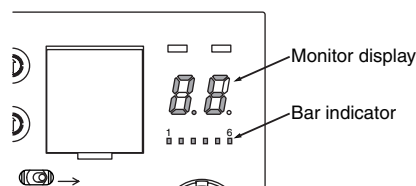
Output from the USB Port
The distance level and Antenna channel are output from the USB port.

DL 06 1 0 * [CR]

Resend Flag (Always "0".)

Antenna channel ("1": channel 1, "2": channel 2)

Distance level ("01" to "06")
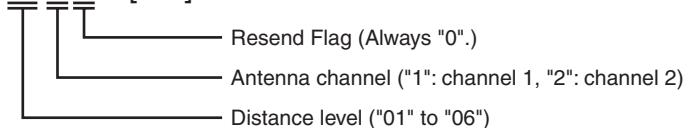
▪ Speed Level Measurement Mode (Read/Write)

Speed Level Measurement Mode can be used to check the Tag movement speed and applicable number of bytes without connecting to a host device. In this mode, the margin available for the Tag movement speed in relation to the number of bytes being accessed is displayed on the bar indicator.

CHECK! The Speed Level Measurement Mode simulates writing data. Actually data is not written to the Tag.

CHECK! The speed level is measured for the number of test bytes set in advance using the PARAMETER SET (SP) command. Refer to *PARAMETER SET (SP)* for details.

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1. Change to Speed Level Measurement Mode.

Reading

SW4, pin 1: OFF, SW4, pin 2: ON, SW4, pin 3: OFF, SW5: ON

Writing

SW4, pin 1: OFF, SW4, pin 2: ON, SW4, pin 3: ON, SW5: ON

2. Move the Tags.

Speed level 3

Travel

Tag

Antenna
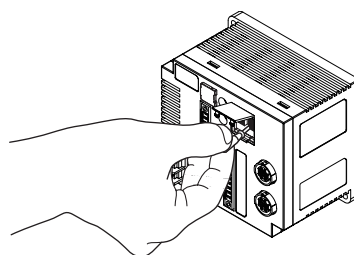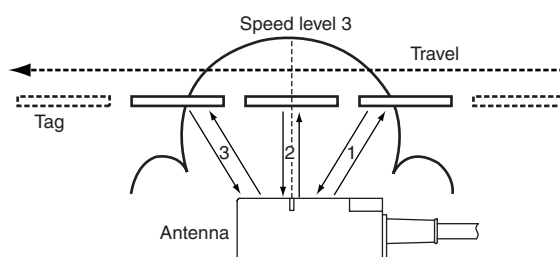
3. The speed level will be displayed on the bar indicator and monitor display.

The number of successful communications between 01 and 99 is displayed on the monitor display. ("--" is displayed to indicate standby status.) The display will show 99 even if more than 99 successful communications were made. "EE" will be displayed if the first communication after the Tag entered the communications area fails. The bar indicator will show the speed level. One LED in the bar indicator will

Monitor display

Bar indicator

light for each 2 successful communications (all six LEDs will be lit after 12 successful communications). The measurement result is also output from the USB port.
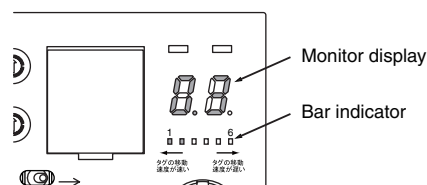
Output from the USB Port

The number of successful communications and the Antenna channel are output from the USB port.

SL 99 1 0 * [CR]

Resend Flag (Always "0".)

Antenna channel ("1": channel 1, "2": channel 2)

Number of continuous successful communications ("01" to "99" or "EE")
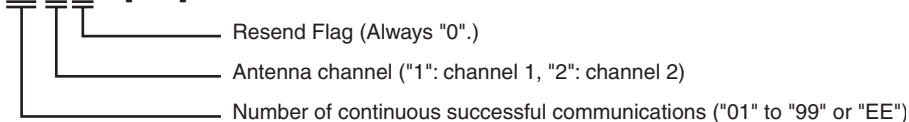
▪ Noise Level Measurement Mode

Noise Level Measurement Mode enables checking spatial noise, noise sources, and the effectiveness of noise countermeasures without connecting to a host device. This mode measures the noise level in the surrounding environment and displays the result on the monitor display. A noise level between 00 and 99 can be output from the USB port as the result.

1. Change to the Noise Level Measurement Mode.
SW4, pin 1: ON, SW4, pin 2: OFF, SW4, pin 3: OFF, SW5: ON

▼
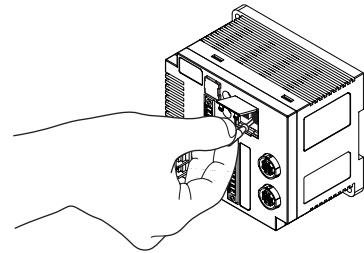
2. Measuring the noise level will be started.

Antenna

▼
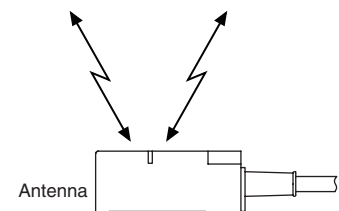
3. The noise level measurement results will be displayed on the monitor display.
The noise in the surrounding environment is displayed between "00" and "99". The measurement result is also output from the USB port.

Monitor display
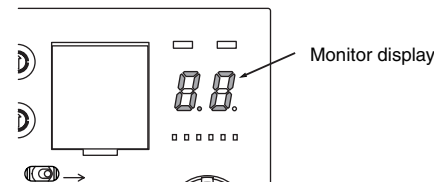
Output from the USB Port
The noise level and Antenna channel are output from the USB port.

NL 00 1 0 * [CR]

Resend Flag (Always "0".)

Antenna channel ("1": channel 1, "2": channel 2)

Noise level ("00" to "99")

▪ Communications Success Rate Measurement Mode

Communications Success Rate Measurement Mode can be used to check the percentage of communications that are successful without connecting to a host device. This mode displays the rate of successful communications without retries between Antennas and Tags on the monitor display.

CHECK! Data is read to measure the communications success rate.

1. Change to Communications Success Rate Measurement Mode.
SW4, pin 1: ON, SW4, pin 2: ON, SW4, pin 3: OFF, SW5: ON

▼
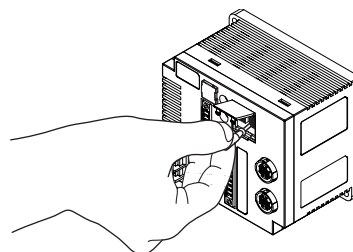
2. Place a Tag inside the Antenna communications range.

Tag
100 communications
Antenna

▼
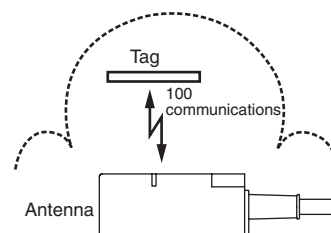
3. The communications success rate will be displayed on the monitor display.

The communications success rate is displayed between 00 and 99 (%). If no communications were successful, "EE" will be displayed. If all communications were successful, "FF" will be displayed. The measurement result is also output from the USB port.

Monitor display
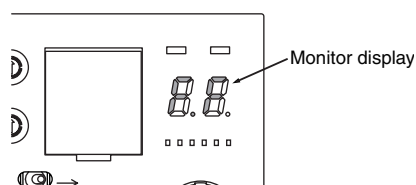
Output from the USB Port

The communications success rate and the Antenna channel are output from the USB port.

CL FF 1 0 * [CR]

Resend Flag (Always "0".)

Antenna channel ("1": channel 1, "2": channel 2)

Communications success rate ("EE", "10 to "99", or "FF")

■ Host Communications Monitor Mode (Protocol Analyzer)

Commands sent by serial communications (RS-232C, RS-422, or RS-485) from the host device and execution result responses can be output to the monitor port (USB) to enable application as a host communications line protocol analyzer.

1. Change to Monitor Mode.

SW4, pin 1: ON, SW4, pin 2: ON, SW4, pin 3: ON, SW5: ON

CHECK!
The mode can also be changed by executing an OPERATION MODE CHANGE command (MO) from the host device while in Run Mode.
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▼
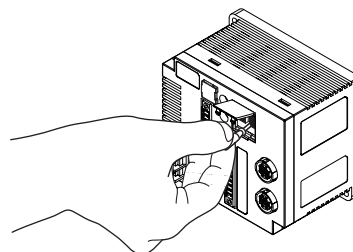
2. Connect a monitor device (e.g., a personal computer) to the ID Controller via the USB port.

▼

3. Commands and responses from communications with the host device will be output to the monitor device.

Monitor

Host device

Monitor
RDSTH100100010*CR
RD72*CR

Command
RDSTH100100010*CR

Antenna

Personal computer

Response
RD72*CR

Programmable Controller
(PLC)

SECTION 3 Switch Settings
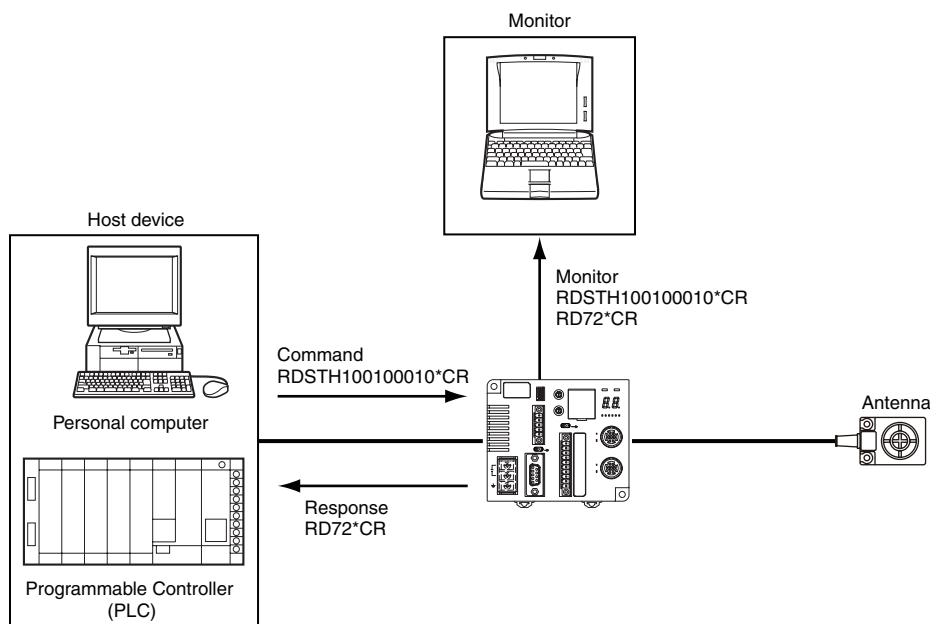
■ Convenient Functions

▪ Tag Communications Test Mode

Tag Communications Test Mode can be used to check tag communications without connecting to a host device. In this mode, the ID Controller communications with Tags and displays the end codes on the monitor display as the results. The measurement result is also output from the USB port to enable checking on a monitor device, e.g., when the ID Controller is installed in a panel and the monitor display is not visible.

CHECK!   Data is read to check tag communications. Writing is not checked.

CHECK!   Communications are checked using Tag communications for the number of test bytes set in advance using the PARAMETER SET (SP) command. Refer to *PARAMETER SET (SP)* for details.

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---

1. Set the Antenna to be used and turn ON the power supply.

Antenna channel setting: SW4, pin 4

▼
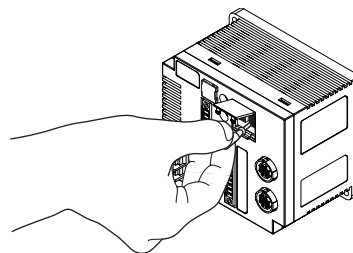
2. Place the ID Controller in Communications Test Mode.

SW4, pin 1: OFF, SW4, pin 2: OFF, SW4, pin 3: ON, SW5: ON

▼

3. Start the test.

Tag

Antenna

▼
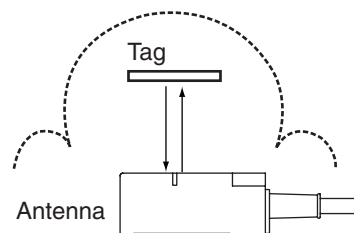
4. The result of communicating with the Tag is displayed on the monitor display.

The end code is displayed on the monitor display. The measurement result is also output from the USB port.

Monitor display
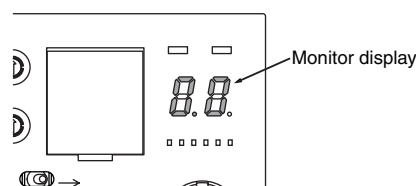
Output from the USB Port

The end code and the Antenna channel are output from the USB port.

TL 00 1 0 * [CR]

Resend Flag (Always "0".)

Antenna channel ("1": channel 1, "2": channel 2)

End code

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■ Host Communications Check Mode

Host Communications Check Mode can be used to check if data sent from the ID Controller is reaching the external device. In this mode, a response is sent to the host device from the ID Controller, making it easier to identify communications setting or wiring errors that cause faults in connections between ID Controllers and host devices.

1. Set pins 3 to 8 on DIP switch SW3 to the desired communications settings and turn ON the power.

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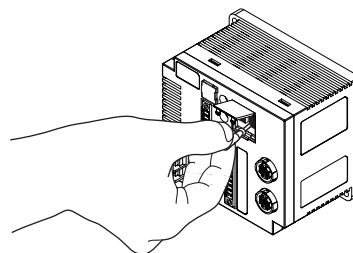
2. Turn OFF the mode switch (SW5) if it is ON.
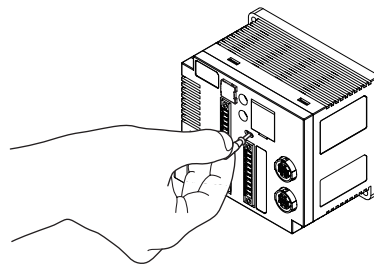
3. Set rotary switch SW1 to 8.
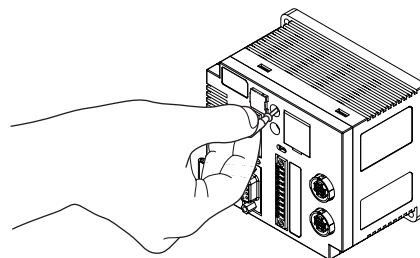
4. Turn ON the mode switch (SW5).

Response frames will be sent to the host device in the following order:

1. A response frame is sent from the RS-232C port
2. A response frame is sent from the RS-422/RS-485 port.
3. A response frame is sent from the USB port.

CHECK! These three steps will be repeated each time the mode switch (SW5) is turned ON until rotary switch SW1 is returned to its normal setting.
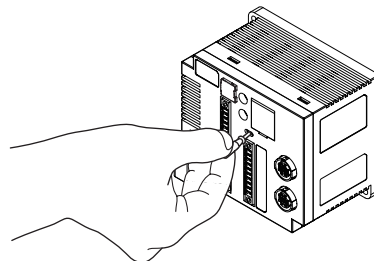
CHECK! Always return the rotary switch (SW1) to its normal setting after completing checking communications with the host device.

Responses to the Host Device

· **Pin 1 on DIP Switch SW3 Turned OFF (DIP Switch Settings Enabled)**

The communications settings from pins 3 to 8 of DIP switch SW3 are output as the response.

· **Pin 1 on DIP Switch SW3 Turned ON (Internal Settings Enabled)**

The communications settings made with the COMMUNICATIONS SET (TR) command are output as the response.

TR 3 7 2 2 * [CR]

Stop bit length
"1": 1 bit
"2": 2 bits (default)

Parity
"0": None
"1": Odd
"2": Even (default)

Data length
"7": 7 bits (default)
"8": 8 bits

Baud rate
"3": 9,600 bps (default)
"4": 19,200 bps
"5": 38,400 bps
"6": 115,200 bps
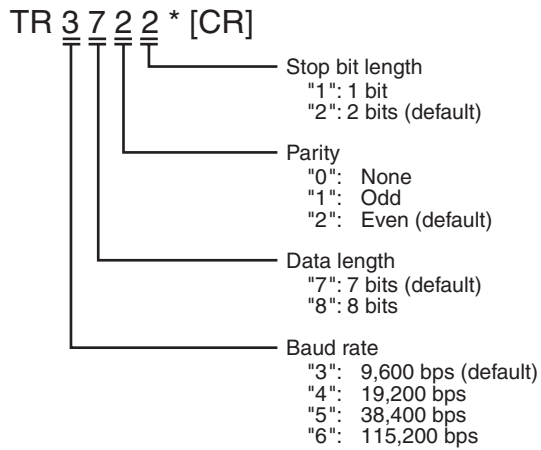
Write Command Memory

A write command executed by the V680-CA5D01/02 ID Controller is stored in memory until the next write command is executed or until the power is reset. Write commands include WRITE, EXPANSION WRITE, AUTO WRITE, and POLLING AUTO WRITE. The write command stored in memory can be executed using the WRITE REPEAT (RP) command.

ID Controller

	Memory	Operation
Operation		Memory initialized
Power ON		
WRITE command 1	→ WRITE command 1	WRITE command 1 executed
WRITE REPEAT command	→ WRITE command 1	WRITE command 1 executed
Read command 1	→ WRITE command 1	READ command 1 executed
WRITE REPEAT command	→ WRITE command 1	WRITE command 1 executed
WRITE command 2	→ WRITE command 2	WRITE command 2 executed
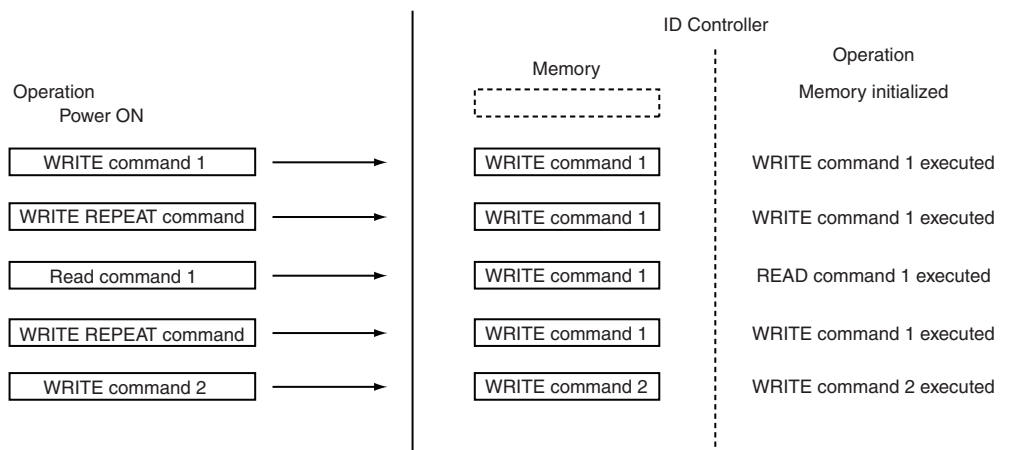
Noise Monitor Function

When executing commands for Tag communications, the maximum value of the noise level can be attached to the response data to constantly monitor noise conditions.

CHECK!
The noise monitor function cannot be used when the V680-H01 Antenna is connected.

CHECK!
To use the noise monitor function it must be enabled using the *PARAMETER SET (SP)* command.

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■ Response Examples

● Noise Monitor Function Enabled

RD 00 1 0 ······ [01] * CR

— Maximum noise level ("01" to "99")
— Read data
— Resend Flag (Always "0".)
— Antenna channel ("1": channel 1, "2": channel 2)
— End code

● Noise Monitor Function Disabled

RD 00 1 0 ······ * CR

— Read data
— Resend Flag (Always "0".)
— Antenna channel ("1": channel 1, "2": channel 2)
— End code
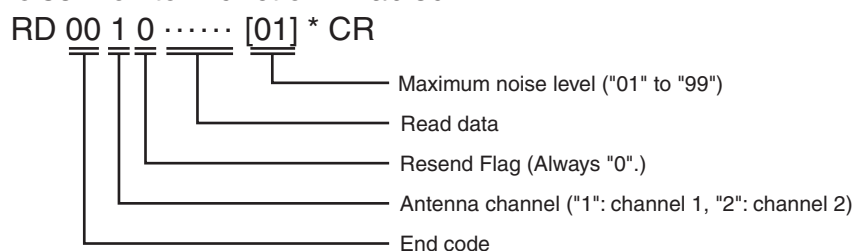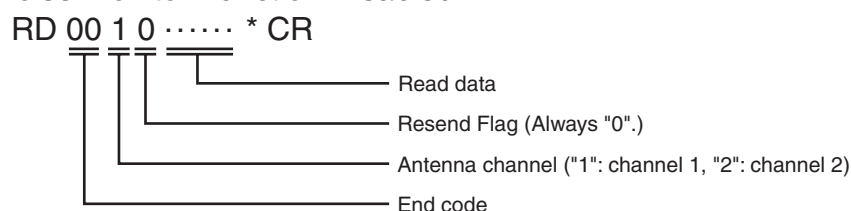
Trigger Input

There is one trigger input for each Antenna (two total) which can be used to tell the ID Controller when to start Tag processing. Once the ID Controller has received a command, it will wait for the rising edge of the trigger input and then communicate with the Tag.
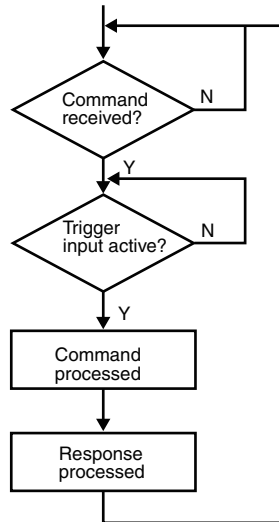
Note: Processing is not stopped even if the trigger input changes during command processing.

If auto commands are used, the ID Controller will wait from the rising edge of the Trigger input for a Tag to enter the communications area. This means that read/write processing will not start after a command is received until the rising edge of the trigger input, even if a Tag approaches.
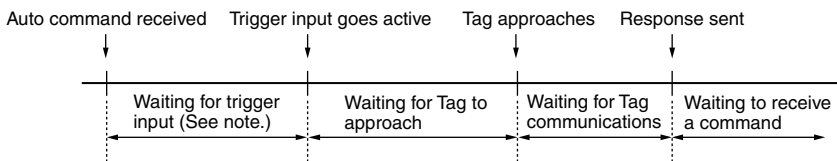
Note: Read/write processing will not start while the ID Controller is waiting for the trigger input, even if a Tag approaches.

Trial Operation

```
┌─────────────────────┐        ┌──────────────────────────────────────────────────────────┐
│   Turn ON power.    │--------│ • Check that the supply voltage and the connection of      │
└─────────────────────┘        │   power supply ter-minals are correct.                     │
                               │ • Check that the supply voltage to the I/O terminals is    │
                               │   correct.                                                 │
                               │ • Check that the RUN indicator on the Controller and the   │
                               │   POWER indi-cator on the Antenna are lit.                 │
                               └──────────────────────────────────────────────────────────┘

┌─────────────────────┐        ┌──────────────────────────────────────────────────────────┐
│ Check operation of  │--------│ • Check stop operation using a reset input.                │
│ external input      │        │                                                            │
│ terminal.           │        │                                                            │
└─────────────────────┘        └──────────────────────────────────────────────────────────┘

┌─────────────────────┐        ┌──────────────────────────────────────────────────────────┐
│ Test host device    │--------│ • Check the communications between the host device and     │
│ communications      │        │   Controller with the TEST command.                        │
│ online              │        │                                                            │
└─────────────────────┘        └──────────────────────────────────────────────────────────┘

┌─────────────────────┐        ┌──────────────────────────────────────────────────────────┐
│ Check communications│--------│ • Check communications between Antennas and Tags with the  │
│ with the READ       │        │   READ command.                                            │
│ command.            │        │                                                            │
└─────────────────────┘        └──────────────────────────────────────────────────────────┘

┌─────────────────────┐        ┌──────────────────────────────────────────────────────────┐
│ Trial operation of  │--------│ • Check the whole system and I/O status while executing    │
│ the system          │        │   actual commands.                                         │
└─────────────────────┘        └──────────────────────────────────────────────────────────┘

     (   END   )
```

CHECK! During installation, use the Maintenance Mode to adequately check the environment and installation.

Communications Test with Host Device

The TEST command is used to perform a communications test of the communications between the Controller and host device. This test enables the cable connections and processing operation of communications to be checked before the trial operation of the whole system.

1. Create a simple communications program on the host device and send the TEST command (TS). If the communications line is normal, the Controller will return the data it received.

Host device TEST command
TSXXX...............XXX*
Test data: 262 characters max.

1) Send

Host device response
TSXXX...............XXX*
Test data response

2) Receive
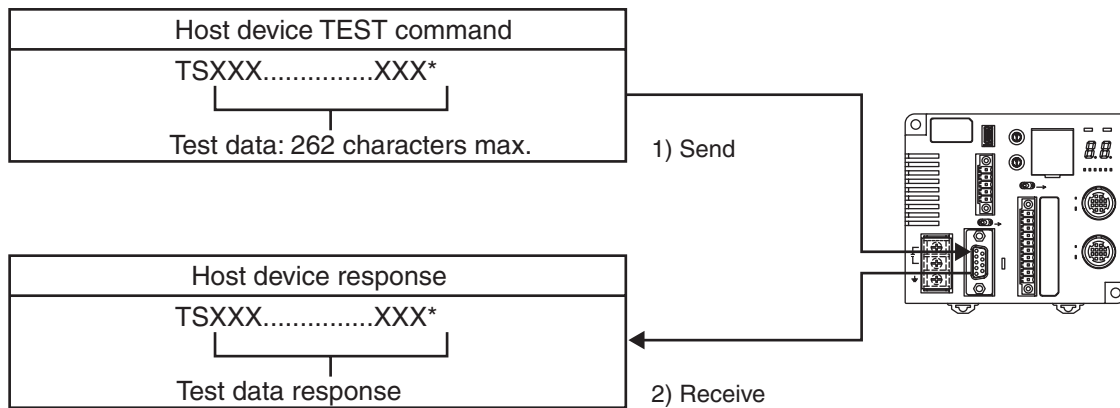
CHECK!

Refer *TEST Command (TS)* for details on the TEST command.

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■ Example

Sending Message Data "OMRON" from Controller No. 2.

Command

SOH	Fixed value	Controller No.	Command code		Message data					FCS		Terminator	
@	0	0	2	T	S	O	M	R	O	N	2	4	*	CR
1	1	2	2		5					2		2	

Response

SOH	Fixed value	Controller No.	Command code		End code		Fixed value	Resend flag	Message data					FCS		Terminator	
@	0	0	2	T	S	0	0	0	0	O	M	R	O	N	2	4	*	CR
1	1	2	2		2		1	1	5					2		2	

Communications Test between Tags and the Antenna

Actual commands can be sent from the host device to test whether communications between Tags and
the Antenna are normal.

1. Send a READ command (communications designation "SA") from the host device.

> CHECK!　For details on the READ command, refer to *READ (RD)*.
>
> 📖 p. 100

▼

2. Position a Tag near the Antenna communications surface.

▼

The Controller will read the Tag data once the Tag enters the Antenna's communications area. An error code will be displayed on the monitor display if communications are not successful.

> CHECK!　If the end code "00" is not displayed on the monitor display, check *List of End Codes* and correct the error.
>
> 📖 p. 155

SECTION 4
Functions

Write Protection

The write protection function protects important data stored in the memory of a Tag, such as product number and model, from being overwritten inadvertently. With this function, the data in a specified area of memory can be protected. It is recommended that important data be write-protected as described in this section.

CHECK! Write protection is turned ON and OFF using pin 7 on DIP switch SW4 (write protection function).

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Setting Write Protection

Write protections is set in the 4 bytes from Tag address 0000H to 0003H.
Write protection is enabled in the most significant bit of address 0000H.

Address \ Bit	7	6	5	4	3	2	1	0
0000H	YES/NO	Upper two digits of start address (00 to FF)						
0001H	Lower two digits of start address (00 to FF)							
0002H	Upper two digits of end address (00 to FF)							
0003H	Lower two digits of end address (00 to FF)							

- Write-protect Bit (Most Significant Bit of Address 0000H)
  - 1: Write-protected (Yes)
  - 0: Not write-protected (No)
- Area in Tag Memory That Can Be Write Protected
  - Start address: 0000H to 7FFFH
  - End address: 0000H to FFFFH

▪ Settings to Write-protect Addresses 0008H through 03E7H

Address \ Bit	Upper digits				Lower digits			
0000H	1	0	0	0	0	0	0	0
	8				0			
0001H	0	0	0	0	1	0	0	0
	0				8			
0002H	0	0	0	0	0	0	1	1
	0				3			
0003H	1	1	1	0	0	1	1	1
	E				7			

▪ Settings to Not Write-protect Addresses

Address \ Bit	Upper digits				Lower digits			
0000H	0	0	0	0	0	0	0	0
	0				0			
0001H	0	0	0	0	0	0	0	0
	0				0			
0002H	0	0	0	0	0	0	0	0
	0				0			
0003H	0	0	0	0	0	0	0	0
	0				0			

CHECK! The write protection function is supported only for the V680-series ID Controllers. It is not valid for Reader/Writers manufactured by other companies.

Tag Service Life Check

The OVERWRITE COUNT CONTROL command (MDS/MDL) can be used to determine whether the Tag overwrite limit has been exceeded. With the MDS command, the overwrite count is subtracted from the data in the user-specified overwrite count control area to determine whether the number of overwrites has been exceeded. The MDL command can also be used to determine whether the overwrite count (100,000 times) has been exceeded. The overwrite count is added to the data in the user-specified overwrite count control area to determine whether 100,000 overwrites has been exceeded.

MDS Command

The overwrite count control area consists of 3 bytes from the specified start address. The decrement value from the overwrite count is written in this area, and if this value is 0 (00$_H$), an end code 76 will be given as a warning. Therefore, to enable control of the number of overwrites, the maximum number of overwrites must be written to the overwrite count control area beforehand.

The user-specified number of overwrites can be set to up to 16,700,000. The number of overwrites in the specifications for Tags, however, is 300,000 overwrites (0493E0$_H$) at 40°C max., so be sure to set the number of overwrites to 300,000 or less. The number of overwrites is written to the control area using a hexadecimal value, and can be read using the READ command.

If the control area data is already 0, the control area value will not be refreshed, and only a warning will be returned as a response. When the refresh count is set as 00$_H$, the count will not be updated, and only an overwrite count check will be performed.

CHECK! For details on the command format, refer to *OVERWRITE COUNT CONTROL (MD S/L)*.

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Area start address ⟶

Upper digit	
Middle digit	3 bytes
Lower digit	
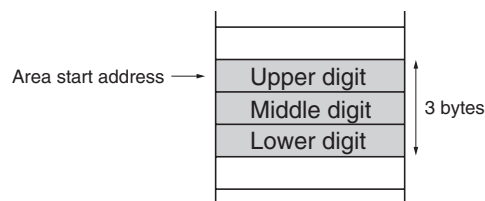
▪ Example Using the OVERWRITE COUNT (MDS) Command

The overwrite count control area consists of 3 bytes starting from address 0010$_H$.

1) The overwrite count of 100,000 times is written.
"WTSTH100100186A0"

0010	01$_H$
0011	86$_H$
0012	A0$_H$

2) The overwrite count of 5 is written.
"MDSTS1001005"
The count is decremented 5 times from 100,000 to produce the following.

0010	01$_H$
0011	86$_H$
0012	9B$_H$

3) The following memory status will exist after the accumulated decremented count is 100,000 times. If "MDSTS1001000" is executed now, "MD76" (overwrite count exceeded) will be returned.

0010	00$_H$
0011	00$_H$
0012	00$_H$

■ MDL Command

The overwrite count control area consists of 3 bytes from the specified start address. The increment value from the overwrite count is written to this area, and if this value is 100,000 (0186A0$_H$) or higher, an end code of 76 will be given as a warning. The number of overwrites is controlled using a hexadecimal value, and can be read using the READ command.

If the control area data is already 100,000 or higher, the control area value will not be refreshed, and only a warning will be returned as a response. When the refresh count is set as 00$_H$, the count will not be updated, and only an overwrite count check will be performed.

Area start address →

Upper digit	
Middle digit	3 bytes
Lower digit	
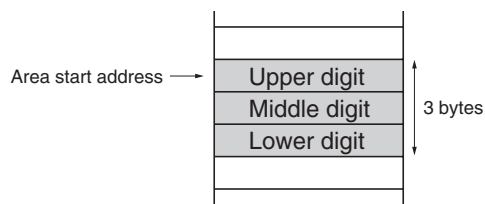
CHECK! For details on the command format, refer to *OVERWRITE COUNT CONTROL (MD S/L)*.

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▪ Example Using Overwrite Count Control Command (MDL)

In the following example, the three bytes starting from address 0010$_H$ is the overwrite count control area.

1)The control area is cleared.

"WTSTH10010000000"

0010	00$_H$
0011	00$_H$
0012	00$_H$

2)The overwrite count of 4 is entered.

"MDSTL1001004"

0010	00$_H$
0011	00$_H$
0012	04$_H$

3)Next, the overwrite count of 5 is entered.

"MDSTL1001005"

The total overwrite count becomes 9 times.

0010	00$_H$
0011	00$_H$
0012	09$_H$

4)The following memory status will exist after the accumulated count has reached 100,000 times. If "MDSTS1001000" is executed now, "MD7610" (overwrite count exceeded) will be returned.

0010	01$_H$
0011	86$_H$
0012	A0$_H$

CHECK! Do not execute the MDS command and MDL command for the same Tag. Doing so will prevent managing the service life.
Number of Overwrites for EEPROM Tags
Between minimum ambient operating temperature and 70°C: 100,000 times
Between minimum ambient operating temperature and 40°C: 300,000 times

Tag Memory Check

The DATA CHECK command (MD C/K) performs a memory check. A CRC (Cyclic Redundancy Check) code calculation, write, and comparison are made using the check block unit specified by the user.
The CRC code is calculated from the generated polynomial expression $x^{16} + x^{12} + x^5 + 1$.

The calculation area is the portion of the check block specified by the start address and the number of bytes excluding the last two bytes. The last two bytes are the check code area.
When check code write is specified (process designation: K), the CRC of the calculation area data is calculated and written to the check code area. When data comparison is specified (process designation: C), the CRC of the calculation area data is calculated and a comparison made with the check code area data. If they coincide, an end code of 00 will be returned for the V680 command (75 will be returned for the V600 command), and if they do not coincide, an end code of 76 will be returned as a warning.
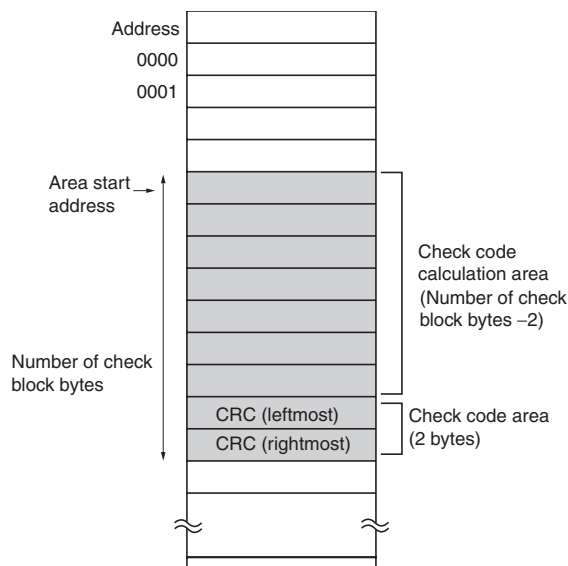
For details on the command format, refer to *DATA CHECK (MD C/K)*.

CHECK!　　p. 109

■ Example of Tag Memory Check

In the following example, the data in address 0010$_H$ to 0012$_H$ is checked.

1) In this example, the following data already exists in the memory.

0010	12$_H$
0011	34$_H$
0012	56$_H$
0013	
0014	

2) Execute MDSTK1001005 (code calculation).
The CRC code 5CD6 calculated from the data 123456 is written to addresses 0013$_H$ and 0014$_H$.

0010	12$_H$
0011	34$_H$
0012	56$_H$
0013	5C$_H$
0014	D6$_H$

3) Execute MDSTC1001005 (code verification).
The normal response MD1000 will be returned if the data coincides.

0010	12$_H$
0011	34$_H$
0012	56$_H$
0013	5C$_H$
0014	D6$_H$

If a data error occurs, MD7610 (a data error warning) will be returned.

0010	00$_H$	← Data error
0011	34$_H$	
0012	56$_H$	
0013	5C$_H$	
0014	D6$_H$	

SECTION 4　Tag Memory Check

Tag Memory Error Correction

The WRITE TAG MEMORY ERROR CORRECTION (QW) command writes a tag memory check and 5-byte error correct code after the write data. The READ TAG MEMORY ERROR CORRECTION (QR) command performs a tag memory check and makes 1-bit memory error corrections.

When a 1-bit memory error is corrected, an end code of 77 will warn that a 1-bit memory error occurred, and the normal data with the error corrected will be returned.
When a memory error of 2 bits or more is detected, an end code of 76 will warn that a fatal error occurred, and the read data will not be returned.

Address
0000
0001
Area start address
Area end address
Check code calculation area
Error correction code calculation area
Memory check code (leftmost)
Memory check code (rightmost)
Error correct code (leftmost)
Error correct code (mid)
Error correct code (rightmost)
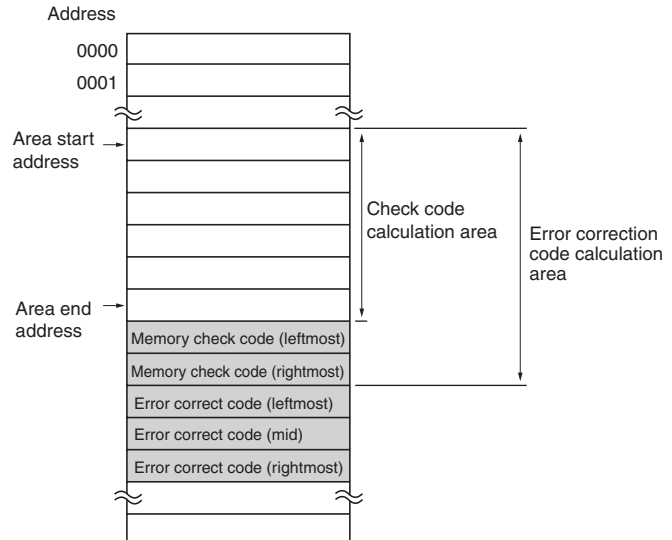
CHECK!

For details on the command format, refer to *READ TAG MEMORY ERROR CORRECTION (QR)and WRITE TAG MEMORY ERROR CORRECTION (QW).*

■ Example of Tag Memory Error Correction

In the following example, the data in address 0010H to 0015H is checked.

1) Send WRITE TAG MEMORY ERROR CORREC-TION (QW).
Command: QWSTH10010313233343536 * (CR)

2) Data is written to address 0010H to 0015H, then a tag memory check and 5-byte error correct code are written to address 0016H to 001AH.

Address		
0010	31	Write data (check code calculation area)
0011	32	
0012	33	
0013	34	
0014	35	
0015	36	
0016	FD	Memory check code (leftmost)
0017	11	Memory check code (rightmost)
0018	00	Error correct code (leftmost)
0019	0C	Error correct code (mid)
001A	3C	Error correct code (rightmost)

3) Send READ TAG MEMORY ERROR CORRECTION (QR).
Command: QRSTH100100006 * (CR)

• When the read data coincides:
Response: QR0010313233343536 * (CR)

• When a memory error of 2 bits or more is detected:
Response: QR76 * (CR)

• When a 1-bit memory error is corrected:
Response: QR7710313233343536 * (CR)

SECTION 5
Communications

Tag Operation and Command Status

Communications Control Protocol

The communications control procedure conforms to OMRON's SYSWAY protocol.

(1) The first right to send is held by the host device, and it is transferred to the ID Controller after a command is sent.

(2) When a response is returned from the ID Controller, the right to send is transferred back to the host device.

(3) The right to send is transferred by using a carriage return (CR).

(4) This protocol supports both 1:1 protocol and 1:N protocol.

(5) The 1:N protocol features one host device connected to more than one ID Controller (32 maximum). A Controller number is added to the end of each command and response to identify the ID Controllers. FCS (Frame Check Sequence) and horizontal parity are used to provide strict error detection.

(6) The 1:1 protocol features one host device connected to one ID Controller. To simplify the protocol, horizontal parity is not used.

(7) The 1:N protocol can be specified even with a 1:1 connection (i.e., N = 1) to add a horizontal parity check.

■ Explanation

1. The host device sends a command to the ID Controller.
2. The ID Controller analyzes the command from the host device, transmits the command, and writes data to or reads data from the memory in the Tag.
3. For read commands, the read data and response are sent to the host device. For write commands, a response indicating that processing is completed is sent to the host device.
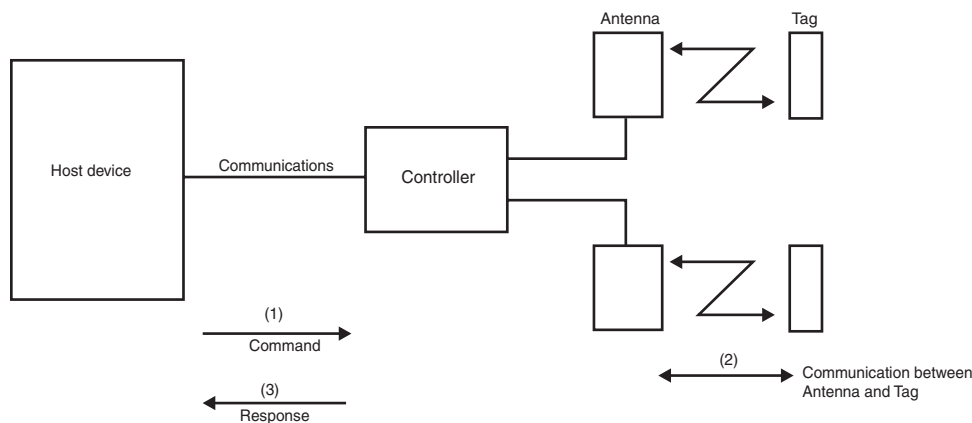
Command Receiving Status

The status of the ID Controller for commands from the host device is described in this section

■ Command Standby Status

No command processing is being performed in this status and ID Controller commands can be received.

■ Processing Command Status

This status exists from the time from when a READ, WRITE, AUTO READ, or AUTO WRITE command is received until a response indicating that command processing has been completed is returned.

When using V680 commands, commands can be sent to the other Antenna while a command is being executed. When using V600 commands, commands cannot be sent to the other Antenna while a command is being executed.

■ Polling Auto Subcommand Standby Status

This status exists from the time when a POLLING AUTO command until the following times:
1. Until processing with the Tag is ended, and the processing results are returned as the response to a command to request polling processing results.
2. Until polling processing is aborted with a command.

In this status, only a POLLING subcommand (REQUEST or ABORT), an ABORT command, or a host command can be received for the same Antenna.

Data Code Designation

Data to be read or written is specified in the command to be handled as either ASCII (JIS8 code) character data or as hexadecimal data.

■ ASCII (JIS8 Code) Designation

- Each data character is allocated 1 byte (1 address) of Tag memory and stored as ASCII (JIS8 code).

• Tag

Address			
0010	4	F	"O"
0011	4	D	"M"
0012	5	2	"R"
0013	4	F	"O"
0014	4	E	"N"

1 byte

• ASCII Designation Example Using 1:1 Protocol

W	T	S	T	A	1	0	0	1	0	O	M	R	O	N	∗	CR

Command code / Communications designation / ASCII designation / Antenna designation / Start address / Write data / Terminator

• ASCII Designation Example Using 1:N Protocol

@	0	Controller No.	W	T	S	T	A	1	0	0	1	0	O	M	R	O	N	FCS	∗	CR

SOH / Fixed value / Controller No. / Command code / Communications designation / ASCII designation / Antenna designation / Start address / Write data / FCS / Terminator

■ Hexadecimal Designation

- Each character is handled as hexadecimal data. Therefore, only characters 0 to F can be received.
- Each two characters of data is stored as is in 1 byte (1 address) of Tag memory. Therefore, always set two-character units (i.e., an even number of characters) for write commands. A command error will occur if an odd number of characters is mistakenly set.

• Tag

Address		
0010	1	9
0011	9	6

1 byte

• Hexadecimal Designation Example Using 1:1 Protocol

W	T	S	T	H	1	0	0	1	0	1	9	9	6	∗	CR

Command code / Communications designation / Hexadecimal designation / Antenna designation / Start address / Write data / Terminator

• Hexadecimal Designation Example Using 1:N Protocol

@	0	Controller No.	W	T	S	T	H	1	0	0	1	0	1	9	9	6	FCS	∗	CR

SOH / Fixed value / Controller No. / Command code / Communications designation / Hexadecimal designation / Antenna designation / Start address / Write data / FCS / Terminator

V600-V680 Command Correspondence

Either V680 or V600 commands can be used for the V680-series ID Controllers. V600 commands can be used in applications in which V600-series ID Controllers were previously used so that the application does not have to be changed. V680 command can be used to take advantage of newly implemented functions.

The command series that is being used is specified on pin 10 of DIP switch SW3. V680 and V600 commands corresponds as shown in the following tables.

Commands for Tag Communications

V680 Commands				V600 Commands		
Name	Command code	Communications designation	Data designation	Name	Command code	Data designation
READ	RD	ST	A/H	READ	RD	A/H
		ST	A/H	EXPANSION READ	XR	A/H
		SA	A/H	AUTO READ	AR	A/H
		PA	A/H	POLLING AUTO READ	PR	A/H
WRITE	WT	ST	A/H	WRITE	WT	A/H
		ST	A/H	EXPANSION WRITE	XW	A/H
		SA	A/H	AUTO WRITE	AW	A/H
		PA	A/H	POLLING AUTO WRITE	PW	A/H
DATA FILL	DF	ST	A/H	DATA FILL	DF	A/H
		SA	A/H	AUTO DATA FILL	AF	A/H
DATA CHECK	MD	ST	C/K	DATA CHECK	MD	C/K
OVERWRITE COUNT CONTROL	MD	ST	S/L	OVERWRITE COUNT CONTROL	MD	S/L
WRITE REPEAT	RP	-	-	WRITE REPEAT	RP	-
COPY	CP	ST	H	COPY	CP	H
AUTO COPY	AP	ST	H	AUTO COPY	AP	H
LARGE READ	ER	ST	A/H	LARGE READ	ER	A/H
READ TAG MEMORY ERROR CORRECTION	QR	ST	A/H	-	-	-
WRITE TAG MEMORY ERROR CORRECTION	QW	ST	A/H	-	-	-

Communications Subcommands

V680 Commands			V600 Commands		
Name	Command code	Data designation	Name	Command code	Data designation
POLLING QUERY	PC	C/E	POLLING QUERY	PR	C/E
				PW	C/E
COMMAND PROCESSING TERMINATE	AA	-	COMMAND PROCESSING TERMINATE	AA	-
ABORT	XZ	-	ABORT	XZ	-

SECTION 5   V600-V680 Command Correspondence

Controller Control Commands

V680 Commands		V600 Commands	
Name	Com-mand code	Name	Com-mand code
COMMUNICATIONS SET	TR	COMMUNICATIONS SET	TR
PARAMETER SET	SP	PARAMETER SET	SP
OPERATION MODE CHANGE	MO	-	-
OPERATION CONDITION SET	SE	-	-
RESPONSE RESEND	RR	-	-
CONTROLLER CONTROL	CC	CONTROLLER CONTROL	CC
READ ERROR INFORMATION	CF	READ ERROR INFORMATION	CF
READ HISTORY INFORMATION	HI	-	-

Host Commands

V680 Commands		V600 Commands	
Name	Com-mand code	Name	Com-mand code
TEST	TS	TEST	TS
VERSION READ	VS	VERSION READ	VS

Evaluation Commands

V680 Commands		V600 Commands	
Name	Com-mand code	Name	Com-mand code
NOISE DETECTION	NS	-	-

V680 Commands

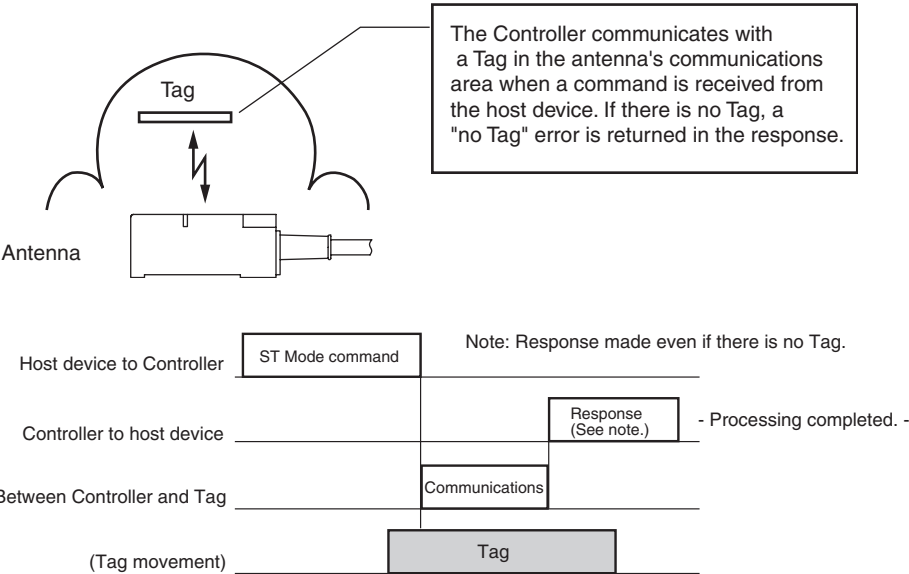## Communications Designation Function

Communications with the Tag are performed according to the communications designation listed in the following table.

Name	Symbol	Description
Single trigger	ST	When the ID Controller receives a command, it communicates with the Tag and then returns a response.
Single auto	SA	When the ID Controller receives a command, it waits to detect a Tag in the Antenna's communication area. When the ID Controller detects a Tag, it communicates with the Tag and then returns a response.
Single input trigger	SI	When the ID Controller receives a command, it communicates with the Tag on the rising edge of the TRG external input and then returns a response.
Repeat auto	RA	The ID Controller repeats the operation for a single auto designation (SA) as Tags enter the Antenna's communications area. The ID Controller communicates with each Tag in the communications area only once even if the Tag remains in the area.
Repeat input trigger	RI	The ID Controller repeats the operation for a single input trigger designation (SI).
Polling auto	PA	The ID Controller performs the operation for a single auto designation (SA) and then returns a response when it receives a POLLING QUERY (PC) command.
Polling input trigger	PI	The ID Controller performs the operation for a single input trigger designation (SI) and then returns a response when it receives a POLLING QUERY (PC) command.
FIFO trigger (See note.)	FT	When the ID Controller receives a command, it returns a response. After communicating, all further operations with that Tag are prohibited. The ID Controller communicates with only one operable Tag in the communications area. If a Tag that has operated for a single trigger designation (ST) is within the communications area, the ID Controller will not communicate with it a second time.
FIFO repeat (See note.)	FR	When the ID Controller receives a command, it waits until a Tag is detected within the Antenna's communications area, then returns a response. After communicating, all further operations with that Tag are prohibited. After returning the response, the ID Controller again waits for a Tag to approach it, and continues until the COMMAND PROCESSING TERMINATE (AA) command is received. The ID Controller communicates with only one operable Tag in the communications area.
Multi-access trigger (See note.)	MT	When the ID Controller receives a command, it communicates with all Tags in the communications area, then it returns a response after it has communicated with them all. After communicating, all further operations with that Tag are prohibited.
Multi-access repeat (See note.)	MR	When the ID Controller receives a command, it waits for a Tag to approach it. It communicates with each Tag in the communications area, and returns a response. After communicating, all further operations with that Tag are prohibited. After returning the response, the ID Controller again waits for a Tag to approach it, and continues until the COMMAND PROCESSING TERMINATE (AA) command is received.
Selective (See note.)	SL	The ID Controller performs a single trigger designation (ST) operation, and communicates only with Tags having the UID that is designated by the command from among all of the Tags in the Antenna's communications area.

Note: These designations cannot be used for communications with the V680-D1KP@@.

■ Single Trigger Communications Designation (ST)

With a Single trigger communications designation (ST), the ID Controller communicates with the Tag when the command is received from the host device. When the ID Controller has completed communicating with the Tag, it sends a response to the host device and then waits for another command. If there is no Tag in the communications error when the ID Controller receives the command from the host device, the ID Controller returns a Tag missing error (error code: 72). Use a sensor or other means to confirm the presence of a Tag before sending the command.

■ Auto Communications Designations (SA, RA, and PA)

With an auto communications designation, the ID Controller communicates with Tags that are automatically detected. When the ID Controller receives the command from the host device, it automatically detects and communicated with any Tag that enters the Antenna's communications area.

Communications start when the Tag enters the antenna's communications area.
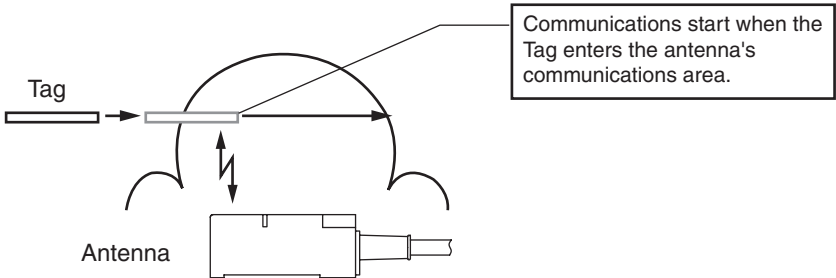
▪ Single Auto Designation (SA)

With a single auto designation, the ID Controller communicates with the Tag, returns a response to the host device, and then enters command standby status.
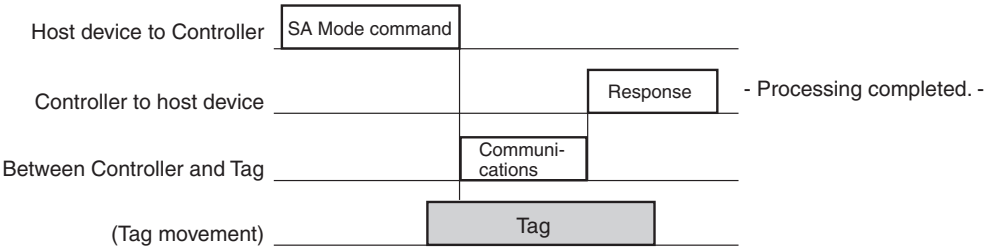
▪ Repeat Auto Designation (RA)

A repeat auto designation causes the ID Controller to repeat the operation for a single auto designation (SA). Once the ID Controller has communicated with a Tag, it will not communicate again with the same Tag until the Tag leaves the Antenna's communications area. The COMMAND PROCESSING TERMINATE command (AA) is used to cancel processing.
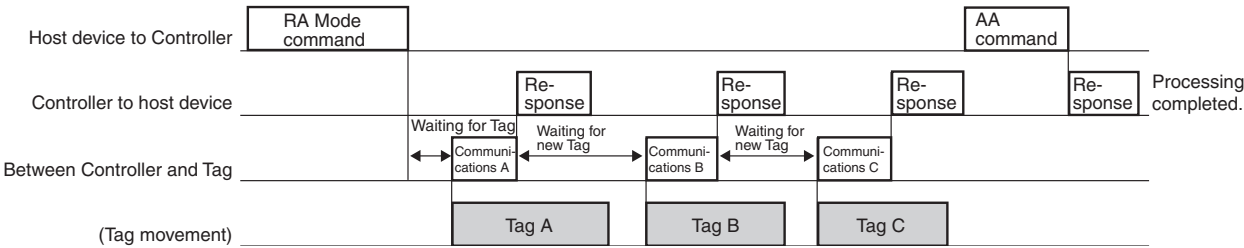
■ Polling Auto Designation (PA)

A polling auto designation causes the ID Controller to return a response indicating reception of a polling command and then perform the operation for a single auto designation (SA). The ID Controller does not return a response until it receives the POLLING QUERY command (PC) (see note 1). The POLLING QUERY command (PC) (see note 2) is also used to cancel processing.

Note 1. A process designation of C is used to request the response.

2. A process designation of E is used to cancel polling.

Host device to Controller	PA Mode command		PC command		PC command	
Controller to host device		Response		Response		Response	- Processing completed. -
		(Accepted)		(No communication)		(Results of communications)
Between Controller and Tag					Communi-cations	
(Tag movement)			Waiting for Tag		Tag	

■ External Trigger Communications Designations (SI, RI, and PI)

The ID Controller communicates with a Tag on the rising edge of the TRG external input signal. These designations can be used to accurately perform communications even on high-speed lines because communications can be directly controlled with the output of a sensor that detects when Tags are in the Antenna's communications area.

To external input on ID Controller

When the Controller receives a command from the host device, it will go on standby and wait for an input signal. (A sensor is just one example of a possible input device.)
When the input signal is received, the Controller will communicate with the Tag in the antenna's communications area. If there is no Tag, a "no Tag" error will be returned.

Tag

Antenna

▪ Single Input Trigger Designation (SI)

With a single input trigger designation, processing is ended when the ID Controller has completed communicating with the Tag.

Host device to Controller — SI Mode command
Note: Response made even if there is no Tag.
Controller to host device — Response (See note.) - Processing completed -
Between Controller and Tag — Communications
External input — Waiting for input

▪ Repeat Input Trigger Designation (RI)

A repeat input trigger designation causes the ID Controller to repeat the operation for a single input trigger designation (SI). The ID Controller communicates with a Tag each time it detects the rising edge or the TRG external input signal. The COMMAND PROCESSING TERMINATE command (AA) is used to cancel processing.

Host device to Controller — SI Mode command — **Note:** Response made even if there is no Tag. — AA command
Controller to host device — Response (See note.) — Response (See note.) — Response - Processing completed -
(Canceled)
Between Controller and Tag — Communications — Communications
External input — Waiting for input — Waiting for input
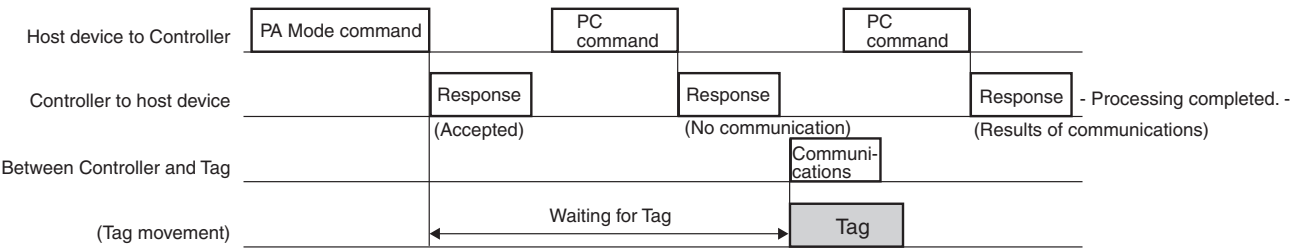
SECTION 5 **V680 Commands**
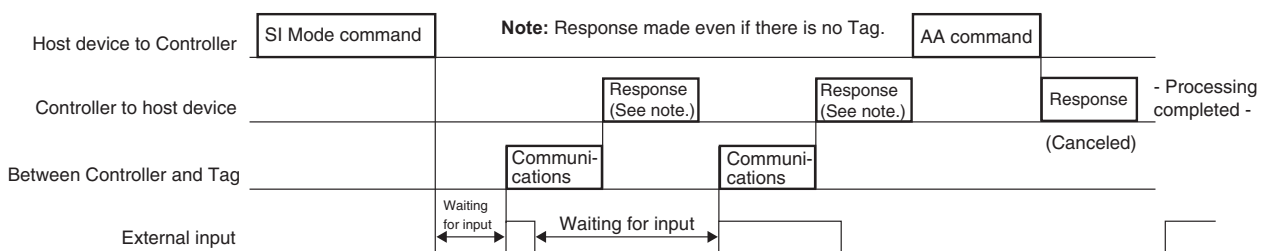
- Polling Input Trigger Designation (PI)

A polling auto designation causes the ID Controller to return a response indicating reception of a polling command and then perform the operation for a single input trigger designation (SI). The ID Controller does not return a response until it receives the POLLING QUERY command (PC) (see note 1). The POLLING QUERY command (PC) (see note 2) is also used to cancel processing.
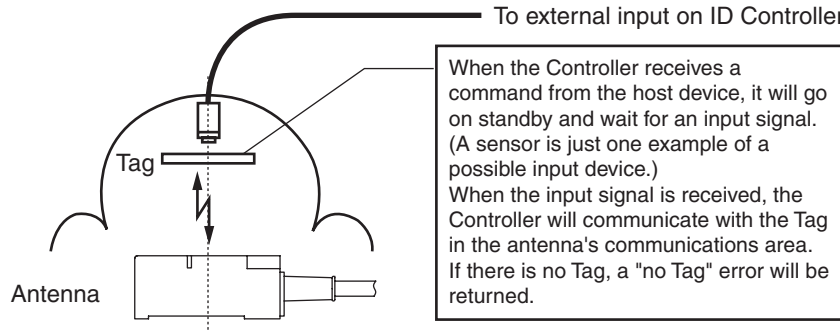
Note 1. A process designation of C is used to request the response.

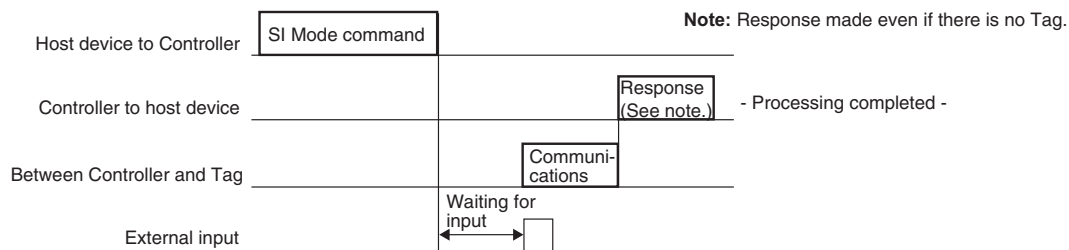**2.** A process designation of E is used to cancel polling.
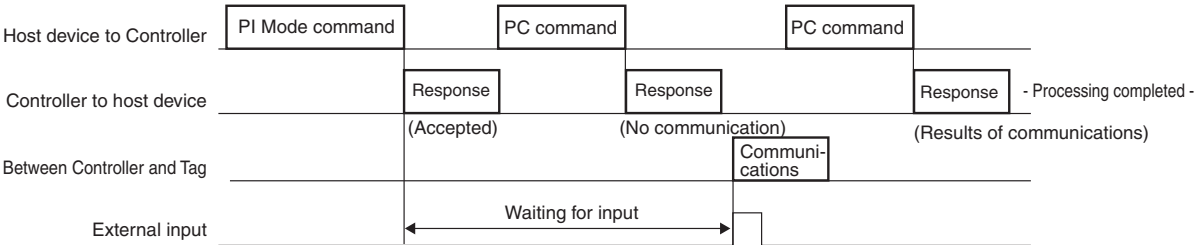
■ FIFO Communications Designations (FT/FR)

The ID Controller communicates in turn with each of the Tags entering the Antenna's communications area. Because all further processing with the Tag is prohibited after communicating, the ID Controller can only communicate with each new Tag that enters the Antenna's communications area.

If two or more Tags enter the Antenna's communications area at the same time, a "no tag" error will be returned.

If a Tag whose access is prohibited leaves the Antenna's communications area, it becomes once again capable of communicating.

The ID Controller communicates in turn with each of the Tags entering the Antenna's communications area. If two or more Tags enter the Antenna's communications area at the same time, a Tag missing error is returned.
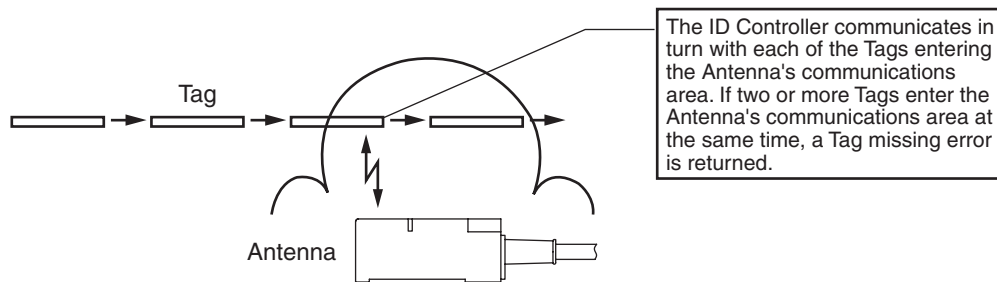
■ FIFO Trigger Designation (FT)

After communicating with a Tag, access to that Tag is prohibited and the ID Controller sends a response to the host device and then waits for another command.
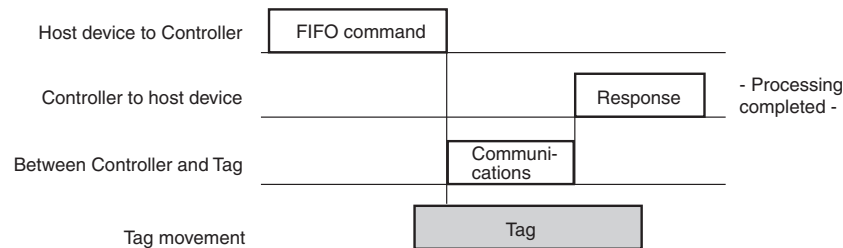
■ FIFO Repeat Designation (FR)

The operation of the FIFO trigger designation (FT) is repeated.
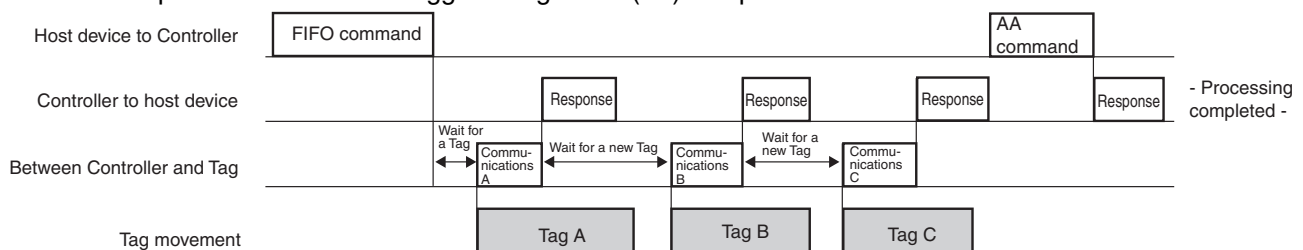
Note: FIFO communications designations (FT/FR) cannot be used for communicating with V680-D1KP@@ Tags.

■ Multi-access Communications Designations (MT/MR)

The ID Controller communicates with all Tags inside the Antenna's communications area.

The ID Controller communicates with all Tags inside the Antenna's communications area. After communicating with them all, it returns a communications completed response (an end code of 03).
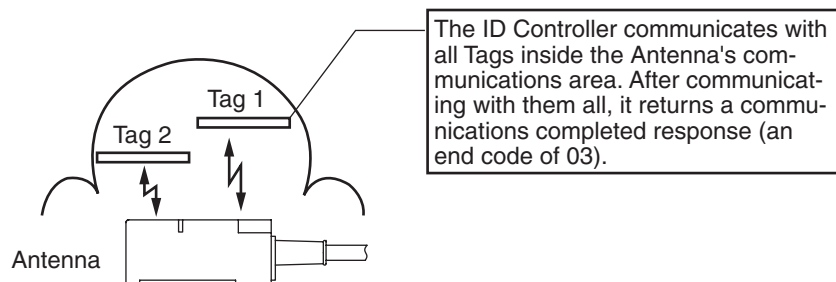
▪ Multi-access Trigger Designation (MT)

Processing ends when the ID Controller has finished communicating with the Tags.
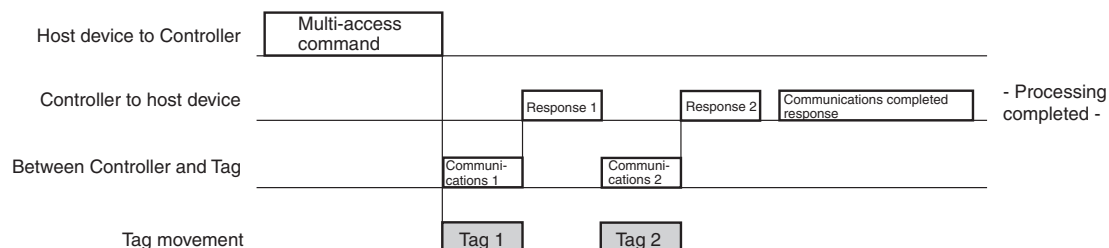
▪ Multi-access Repeat Designation (MR)

The operation of the multi-access trigger designation (MT) is repeated.
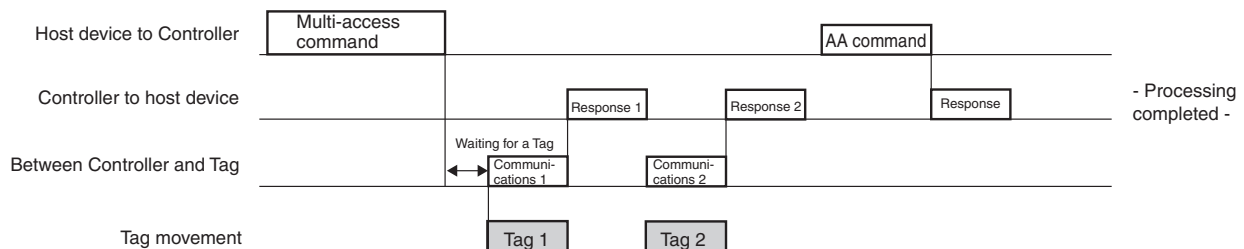
Note: Multi-access communications designations (MT/MR) cannot be used for communicating with V680-D1KP@@ Tags.

■ Selective Communications Designation (SL)

The ID Controller communicates only with Tags having the UID that is designated by the command from among all of the Tags in the Antenna's communications area.

The ID Controller communicates only with Tags having the UID that is designated by the command from among all of the Tags in the Antenna's communications area.
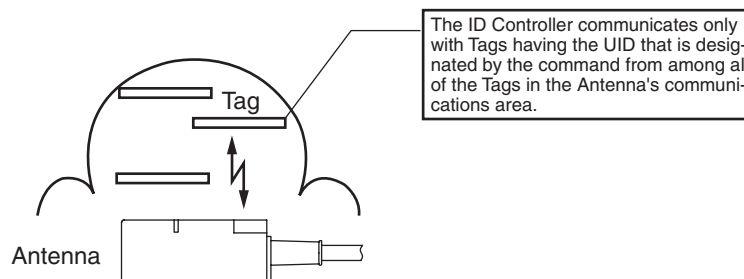
Note: The selective communications designation (SL) cannot be used for communicating with V680-D1KP@@ Tags.

Command and Response Formats

This section describes the formats of the commands sent from the host device to the ID Controller and the responses returned by the ID Controller to the host device.

■ Command Frame

▪ 1:1 Protocol

▪ 1:N Protocol
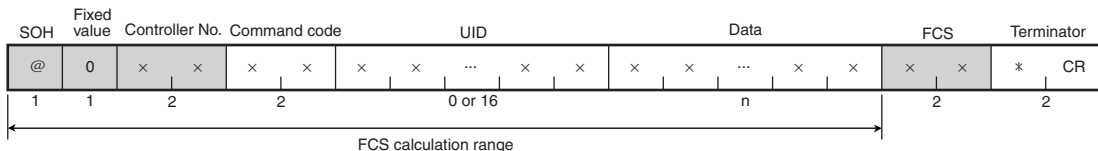
> The shaded portion is added for the 1:N protocol.
> The Controller No. is given as a decimal number between 00 and 31.

Name	Description
SOH	@ mark indicates the start of the frame.
Fixed value	Fixed data used to make the frame length an even number of bytes. (Always 0.)
Controller No.	A number used to identify the ID Controller to be communicated with when using 1:N connections. The Controller number is set on two rotary switches (SW1 and SW2).
Command code	A code that specifies the command to be executed.
UID	A unique identifier used to identify Tags.
Data	Data that specifies parameters for command execution (e.g., addresses or number of bytes), write data, etc.
FCS	Horizontal parity check data that is added when using 1:N protocol.
Terminator	Indicates the end of the command or response.

■ Response Frame

▪ 1:1 Protocol

Command code	End code	Antenna desig-nation	Resend flag	UID	Data	Terminator
× ×	× ×	×	×	× × ··· × ×	× × ··· × ×	∗ CR
2	2	1	1	0 or 16	n	2

▪ 1:N Protocol

SOH	Controller No.	Command code	End code	Antenna desig-nation	Resend flag	UID	Data	FCS	Terminator
@ 0	× ×	× ×	× ×	×	×	× × ··· × ×	× × ··· × ×	× ×	∗ CR
1 1	2	2	2	1	1	0 or 16	n	2	2

FCS calculation range

Name	Description
End code	Indicates the execution result for the command. Refer to *List of End Codes* for information on end codes. p. 155
Antenna designation	Indicates the number of the Antenna used for communications. "1": Antenna 1 "2": Antenna 2
Resend flag	A flag indicating the response for resends. "0": Response after normal command processing "1": Response returned for a RESPONSE RESEND (RR) command.

Note: Other than the above items, the same data as the command frame is returned in the response.

List of Commands

Commands can be classified into five major types.

■ Commands for Tag Communications

The following commands are used to communicate with Tags.

Command code	Name	Process designation	Description	Page
RD	READ	A/H	Reads up to 2 Kbytes of data from a Tag.	p. 100
WT	WRITE	A/H	Writes up to 2 Kbytes of data to the memory of a Tag.	p. 102
DF	DATA FILL	A/H	Writes the specified data to the specified number of bytes beginning from the specified start address.	p. 104
MD	DATA CHECK	C/K	Checks the memory check code in the Tag.	p. 109
	OVERWRITE COUNT CONTROL	S/L	Used to manage the number of times data is written to a Tag.	p. 107
RP	WRITE REPEAT	-	Executes the most recently executed write command again.	p. 111
ID	READ ID	H	Reads the Tag's ID code.	p. 112
CP	COPY	H	Reads data from the memory of a Tag using one Antenna and writes it to the memory of the Tag in the other Antenna's communications area.	p. 113
AP	AUTO COPY	H	Waits for Tags to approach and then reads data from the memory of a Tag using one Antenna and writes it to the memory of the Tag in the other Antenna's communications area.	p. 115
ER	LARGE READ	A/H	Reads up to 8 Kbytes of data from a Tag.	p. 117
QR	READ TAG MEMORY ERROR CORRECTION	A/H	Reads data from the memory of a Tag. Also checks the memory check code in the Tag to determine the accuracy of the data.	p. 120
QW	WRITE TAG MEMORY ERROR CORRECTION	A/H	Writes data to the memory of the Tag. Also writes the memory check code for the data reliability inspection to the memory of the Tag.	p. 122

■ Communications Subcommands

The following commands are used to cancel command execution.

Command code	Name	Process designation	Description	Page
PC	POLLING QUERY	C/E	Queries or cancels polling processing.	p. 124
AA	COMMAND PROCESSING TERMINATE	-	Forcefully ends communications with a Tag.	p. 126
XZ	ABORT	-	Resets the ID Controller to the status entered immediately after turning ON the power supply. The ID Controller does not send a response. Do not use the ABORT command while the ID Controller is communicating with a Tag.	p. 127

■ Controller Control Commands

The controller control commands are used to set conditions for tag communications, to reset the ID Controller, etc.

Command code	Name	Description	Page
US	UID ADDITION SET	Sets whether or not UID should be added to the read command (RD) response.	p. 128
TR	COMMUNICATIONS SET	Sets serial communications parameters for communicating with the host device.	p. 129
SP	PARAMETER SET	Sets, reads, or initializes ID Controller parameters.	p. 131
MO	OPERATION MODE CHANGE	Changes the operation mode.	p. 135
SE	OPERATION CONDITION SET	Sets operation conditions for Self Execution Mode.	p. 137
RR	RESPONSE RESEND	Resends the last response that was sent.	p. 143
CC	CONTROLLER CONTROL	Controls or confirms ID Controller I/O.	p. 144
CF	READ ERROR INFORMATION	Reads the error log.	p. 146
HI	READ HISTORY INFORMA-TION	Reads the ID Controller's history information.	p. 148

■ Host Commands

The following commands are used to control the ID Controller.

Command code	Name	Description	Page
TS	TEST	Checks the communications conditions between the ID Controller and host device. The data sent by the host device is returned by the ID Controller without modification.	p. 150
VS	VERSION READ	Read the software version of the ID Controller.	p. 151

■ Evaluation Command

The following command is used to check ambient noise.

Command code	Name	Description	Page
NS	NOISE DETECTION	Measures noise under normal conditions. The ID Controller returns the noise level as the results of the measurement.	p. 152

FCS Calculation Example
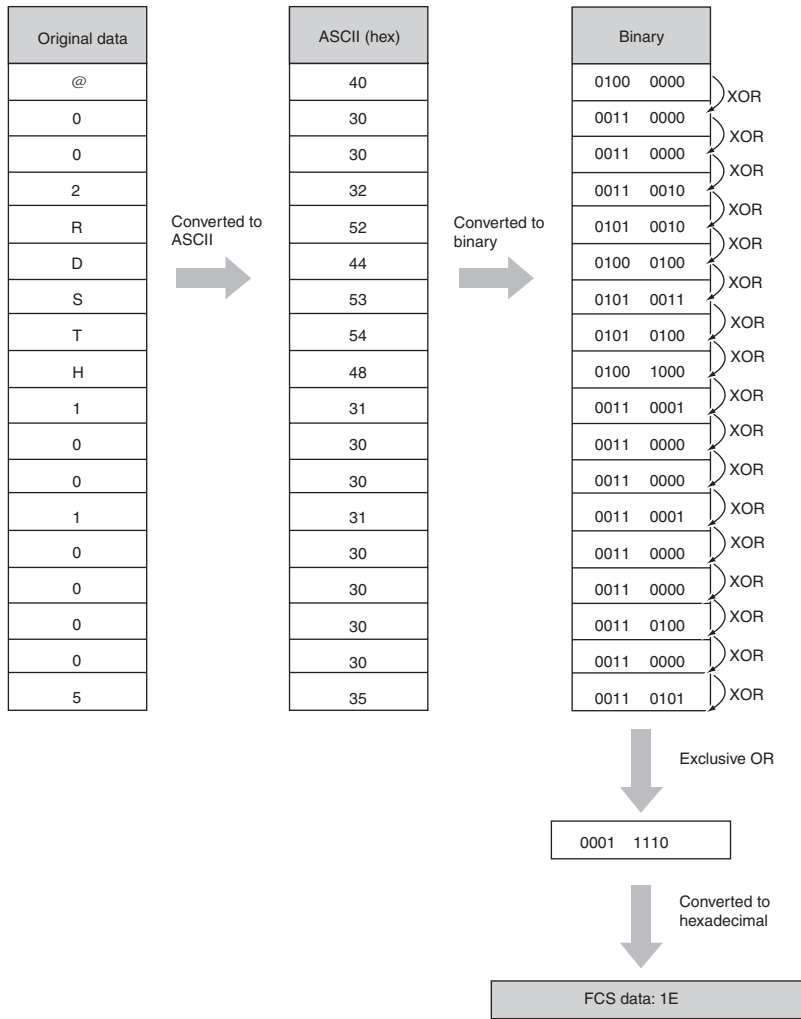
■ Reading 5 Bytes Started from Address 0010H

	Fixed value	Controller No.	Command code	Data											FCS		Terminator	
SOH																		
@	0	0 2	R D	S	T	H	1	0	0	1	0	0	0	0	5	1 E	*	CR

FCS calculation range

Original data		ASCII (hex)		Binary	
@		40		0100 0000	XOR
0		30		0011 0000	XOR
0		30		0011 0000	XOR
2	Converted to ASCII	32	Converted to binary	0011 0010	XOR
R		52		0101 0010	XOR
D		44		0100 0100	XOR
S		53		0101 0011	XOR
T		54		0101 0100	XOR
H		48		0100 1000	XOR
1		31		0011 0001	XOR
0		30		0011 0000	XOR
0		30		0011 0000	XOR
1		31		0011 0001	XOR
0		30		0011 0000	XOR
0		30		0011 0000	XOR
0		30		0011 0100	XOR
0		30		0011 0000	XOR
5		35		0011 0101	XOR

Exclusive OR

0001 1110

Converted to hexadecimal
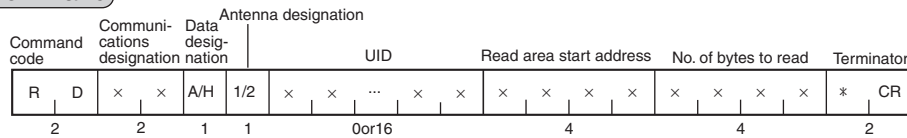
FCS data: 1E

Commands for Tag Communications

This section describes the commands that are used to communicate with Tags.

■ READ (RD)

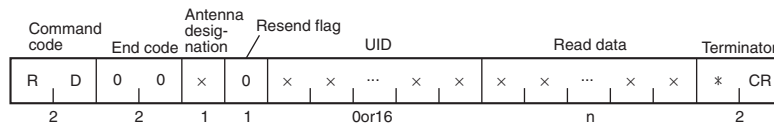The READ command reads up to 2 Kbytes of data from a Tag.
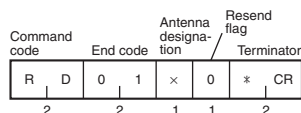
▪ 1:1 Protocol

Command

Communications designation	Specifies the method of communications with the Tag. Refer to *Communications Designation Function* for details on the communications designation. 📖 p. 87
Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal. Up to 2 Kbytes can be read with one command. Setting range: 0001$_H$ to 0800$_H$ • 1000 Byte Tags (V680-D1KP@@) ASCII: 1000 bytes (1000 characters) Hexadecimal: 1000 bytes (2000 characters) • 8k/32k Byte Tags (V680-D8KF68/-D32KF68) ASCII: 2048 bytes (2048 characters) Hexadecimal: 2048 bytes (4096 characters) • 2000 Byte Tags (V680-D2KF@@) ASCII: 2000 bytes (2000 characters) Hexadecimal: 2000 bytes (4000 characters)

Response

Communications Designation Other Than PA or PI

Communications Designation of PA or PI

UID	A unique identifier used to identify Tags. Added in the following cases: • Added when the ADD UID (US) command is set to add a UID. • Added for multi-access communications designations (MT/MR).
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

▪ 1:N Protocol

Command

SOH	Fixed value	Command code	Communications designation	Data designation	Antenna designation	UID	Read area start address	No. of bytes to read	FCS	Terminator
@	0	× × R D	× ×	A/H	1/2	× × × × ×	× × × ×	× × × ×	× ×	* CR
1	1	2 2	2	1	1	0or16	4	4	2	2

(Column labels above: Controller No. over "× ×" in Command code; Antenna designation over Data designation/1/2)

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. 📖 p. 87
Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal. Up to 2 Kbytes can be read with one command. Setting range: 0001H to 0800H • 1000 Byte Tags (V680-D1KP@@) ASCII: 1000 bytes (1000 characters) Hexadecimal: 1000 bytes (2000 characters) • 8k/32k Byte Tags (V680-D8KF68/-D32KF68) ASCII: 2048 bytes (2048 characters) Hexadecimal: 2048 bytes (4096 characters) • 2000 Byte Tags (V680-D2KF@@) ASCII: 2000 bytes (2000 characters) Hexadecimal: 2000 bytes (4000 characters)

Response

Communications Designation Other Than PA or PI

SOH	Fixed value	Command code	End code	Resend flag	UID	Read data	FCS	Terminator
@	0	× × R D	0 0	× 0	× × … × ×	× × … × ×	× ×	* CR
1	1	2 2	2	1 1	0or16	n	2	2

(Column labels above: Controller No. over Command code; Antenna designation over Resend flag)

Communications Designation of PA or PI

SOH	Fixed value	Command code	End code	Resend flag	FCS	Terminator
@	0	× × R D	0 1	× 0	× ×	* CR
1	1	2 2	2	1 1	2	2

(Column labels above: Controller No. over Command code; Antenna designation over Resend flag)

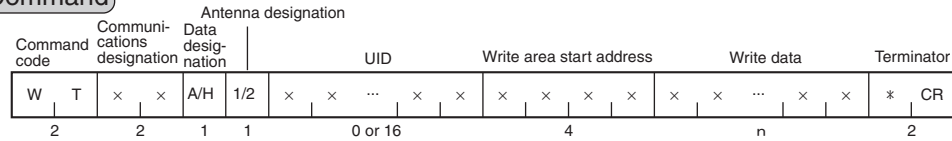| UID	A unique identifier used to identify Tags. Added in the following cases: • Added when the ADD UID (US) command is set to add a UID. • Added for multi-access communications designations (MT/MR).
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

■ WRITE (WT)

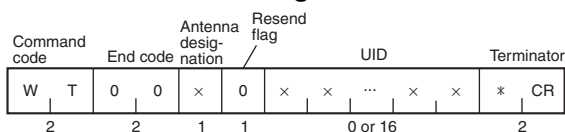The WRITE command writes up to 2 Kbytes of data to the memory of a Tag.

▪ 1:1 Protocol

Command

			Antenna designation					
Command code	Communications designation	Data designation		UID	Write area start address	Write data	Terminator	

W	T	×	×	A/H	1/2	×	×	⋯	×	×	×	×	×	×	×	×	⋯	×	×	∗	CR
2		2		1	1			0 or 16				4				n				2	

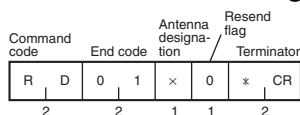| Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. 📖 p. 87
Data designation	Specifies the code format when sending the Tag write data. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH

Write data	Specified the data to be written to the Tag.
	Up to 2 Kbytes can be written with one command.
	• 1000 Byte Tags (V680-D1KP@@)
	  ASCII: 1000 bytes (1000 characters)
	  Hexadecimal: 1000 bytes (2000 characters)
	• 8k/32k Byte Tags (V680-D8KF68/-D32KF68)
	  ASCII: 2048 bytes (2048 characters)
	  Hexadecimal: 2048 bytes (4096 characters)
		• 2000 Byte Tags (V680-D2KF@@)
		  ASCII: 2000 bytes (2000 characters)
		  Hexadecimal: 2000 bytes (4000 characters)

Response

Communications Designation Other Than PA or PI

		Antenna designation	Resend flag				
Command code	End code			UID		Terminator	

W	T	0	0	×	0	×	×	⋯	×	×	∗	CR
2		2		1	1			0 or 16			2	

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.

Communications Designation of PA or PI

		Antenna designation	Resend flag	
Command code	End code			Terminator

R	D	0	1	×	0	∗	CR
2		2		1	1	2	

UID	A unique identifier used to identify Tags. Added only for multi-access communications designations (MT/MR).

■ 1:N Protocol

Command

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. p. 87
Data designation	Specifies the code format when sending the Tag write data. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH
Write data	Specified the data to be written to the Tag. Up to 2 Kbytes can be written with one command. • 1000 Byte Tags (V680-D1KP@@) 　ASCII: 1000 bytes (1000 characters) 　Hexadecimal: 1000 bytes (2000 characters) • 8k/32k Byte Tags (V680-D8KF68/-D32KF68) 　ASCII: 2048 bytes (2048 characters) 　Hexadecimal: 2048 bytes (4096 characters) • 2000 Byte Tags (V680-D2KF@@) 　ASCII: 2000 bytes (2000 characters) 　Hexadecimal: 2000 bytes (4000 characters)

Response

Communications Designation Other Than PA or PI

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.
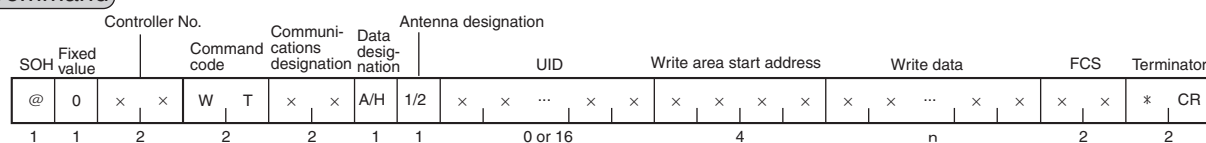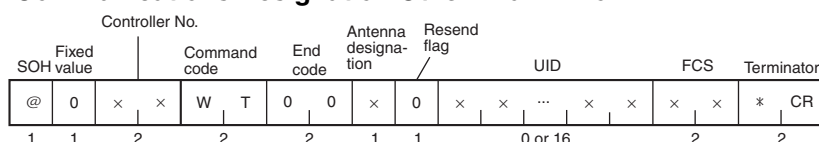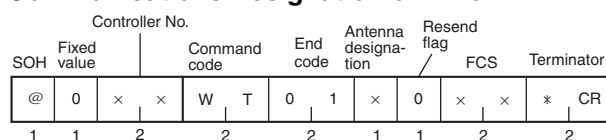
Communications Designation of PA or PI

UID	A unique identifier used to identify Tags. Added only for multi-access communications designations (MT/MR).

■ DATA FILL (DF)

The DATA FILL command writes the designated data for the specified number of bytes beginning from the specified start address.

CHECK!

This command will write data even to areas of the Tag for which write protection has been set. Confirm that there is no important data in the area being written before executing this command.

▪ 1:1 Protocol

Command

Command code	Communi-cations designation	Data desig-nation	Antenna designation	UID	Write area start address	No. of bytes to write	Designated data	Terminator
D F	× ×	A/H	1/2	× × ... × ×	× × × ×	× × × ×	× × × ×	∗ CR
2	2	1	1	0or16	4	4	2or4	2

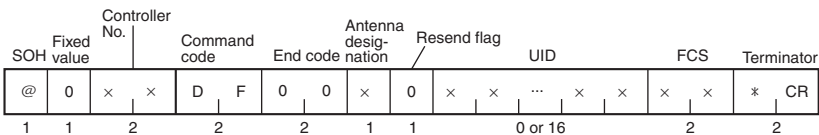| Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. ▭ p. 87
Data designation	Specifies the code format when sending the Tag write data. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000_H to $FFFF_H$ (When 0000H is specified: Writes up to the end address.)
No. of bytes to write	Specifies the number of bytes of data to write to the Tag in 4-digit hexadecimal. Setting range: 0001_H to 0800_H
Designated data	Specified the data to be written to the Tag. • ASCII: 2 digits specified. • Hexadecimal: 4 digits specified.

Response

Command code	End code	Antenna desig-nation	Resend flag	UID	Terminator
D F	0 0	×	0	× × ... × ×	∗ CR
2	2	1	1	0or16	2

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.
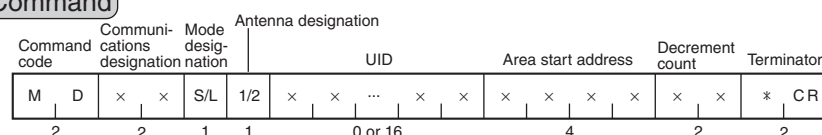
UID	A unique identifier used to identify Tags. Added only for multi-access communications designations (MT/MR).

Example

In this example, 0101H is written to Tag memory for 0006H bytes starting from address 0030H using Antenna 1. The communications designation is "ST".

Command

Command code		Communications designation		Data designation	Antenna designation	Write area start address				No. of bytes to write				Designated data				Terminator	
D	F	S	T	H	1	0	0	3	0	0	0	0	6	0	1	0	1	∗	CR
2		2		1	1	4				4				4				2	

Response

Command code		End code		Antenna designation	Resend flag	Terminator	
D	F	0	0	1	0	∗	CR
2		2		1	1	2	

Before Writing

002FH	2	F
0030H	3	0
0031H	3	1
0032H	3	2
0033H	3	3
0034H	3	4
0035H	3	5
0036H	3	6

After Writing

002FH	2	F
0030H	0	1
0031H	0	1
0032H	0	1
0033H	0	1
0034H	0	1
0035H	0	1
0036H	3	6

▪ 1:N Protocol

Command

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. p. 87
Data designation	Specifies the code format when sending the Tag write data. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to write	Specifies the number of bytes of data to write to the Tag in 4-digit hexadecimal. Setting range: 0001H to 0800H

Response

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.

UID	A unique identifier used to identify Tags. Added only for multi-access communications designations (MT/MR).

■ OVERWRITE COUNT CONTROL (MD S/L)

The OVERWRITE COUNT CONTROL command is used to manage overwrite counts for EEPROM Tags. The specified overwrite count control area data is updated to enable determining when the EEPROM's write life has expired.
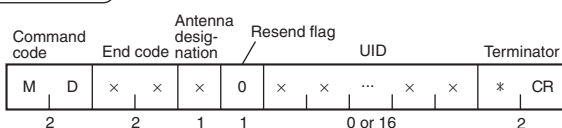
▪ 1:1 Protocol

Command

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. 📖 p. 87
Mode designation	Specifies the check process. "S": Subtraction (Overwrite control count can be set by user.) (16,700,000 writes max.) (See note.) "L": Addition (Overwrite control count fixed at 100,000 writes.)
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Area start address	Specifies the start address of the overwrite count control area in 4-digit hexadecimal. Setting range: 0000H to FFFDH
Decrement count	Specifies the number of refresh operations in 2-digit hexadecimal. Setting range: 00H to FFH (00H: Performs overwrite count check only.) Refer to Tag Service Life Check for details. 📖 p. 77

Note: The write life for EEPROM Tags is 300,000 writes at 40°C.
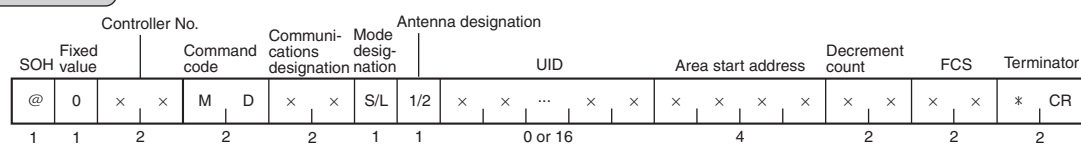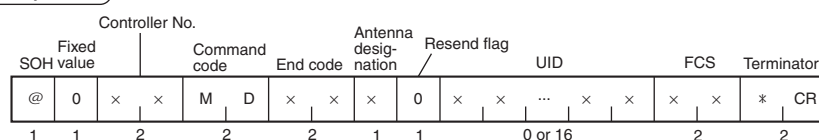
Response

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.

End code	Indicates the execution result for the command. 00: Normal end 76: Data error warning Refer to List of End Codes for information on other end codes. 📖 p. 155
UID	A unique identifier used to identify Tags. Added only for multi-access communications designations (MT/MR).

SECTION 5 V680 Commands

▪ 1:N Protocol

Command

Controller No.
Communi-
cations   Mode
Command   designation   desig-   Antenna designation   Decrement
SOH   Fixed value   code   nation   UID   Area start address   count   FCS   Terminator

@	0	×	×	M	D	×	×	S/L	1/2	×	×	...	×	×	×	×	×	×	×	×	×	×	*	CR
1	1	2		2		2		1	1	0 or 16					4				2		2		2	

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. p. 87
Mode designation	Specifies the check process. "S": Subtraction (Overwrite control count can be set by user.) (16,700,000 writes max.) (See note.) "L": Addition (Overwrite control count fixed at 100,000 writes.)
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Area start address	Specifies the start address of the overwrite count control area in 4-digit hexadecimal. Setting range: 0000H to FFFDH
Decrement count	Specifies the number of refresh operations in 2-digit hexadecimal. Setting range: 00H to FFH (00H: Performs overwrite count check only.) Refer to *Tag Service Life Check* for details. p. 77

Note: The write life for EEPROM Tags is 300,000 writes at 40°C.

Response

Controller No.
Antenna
Command   desig-   Resend flag
SOH   Fixed value   code   End code   nation   UID   FCS   Terminator

@	0	×	×	M	D	×	×	×	0	×	×	...	×	×	×	×	*	CR
1	1	2		2		2		1	1	0 or 16					2		2	

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.
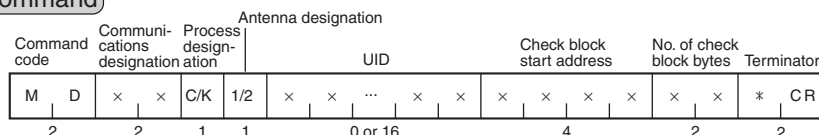
End code	Indicates the execution result for the command. 00: Normal end 76: Data error warning Refer to List of End Codes for information on other end codes. p. 155
UID	A unique identifier used to identify Tags. Added only for multi-access communications designations (MT/MR).

■ DATA CHECK (MD C/K)

The DATA CHECK command is used to write or verify the CRC code in the specified check block. The CRC code is generated using the following polynomial $X^{16} + X^{12} + X^5 + 1$.
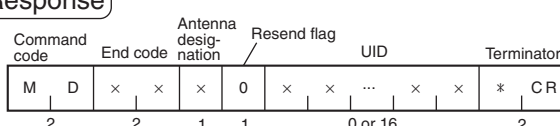
▪ 1:1 Protocol

Command

Command code	Communications designation	Process designation	Antenna designation	UID	Check block start address	No. of check block bytes	Terminator
M D	× ×	C/K	1/2	× × ··· × ×	× × × ×	× ×	＊ C R
2	2	1	1	0 or 16	4	2	2

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. 📖 p. 87
Process designation	Specifies the check process. "C": Check code verification "K": Check code calculation
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Check block start address	Specifies the start address of the check block in 4-digit hexadecimal. Setting range: 0000H to FFFDH
No. of check block bytes	Specifies the number of bytes in the check block in 2-digit hexadecimal. Setting range: 00H, 03H to FFH (Specify 00H for 256 bytes.) Specify the number of bytes in the check code calculation area plus two for the number of check block bytes. Refer to *Tag Memory Error Correction* for details. 📖 p. 80

Response

Command code	End code	Antenna designation	Resend flag	UID	Terminator
M D	× ×	×	0	× × ··· × ×	＊ C R
2	2	1	1	0 or 16	2

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.

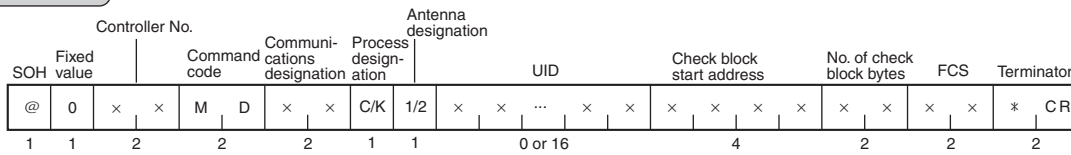|	
End code	Indicates the execution result for the command. 00: Normal end, Data normal (only when verification is performed) 76: Data error warning (only when verification is performed) Refer to *List of End Codes* for information on other end codes. 📖 p. 155
UID	A unique identifier used to identify Tags. Added only for multi-access communications designations (MT/MR).

Refer to *Tag Memory Error Correction* for details on memory checks.
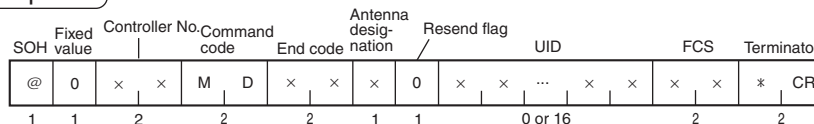
CHECK! 📖 p. 80

SECTION 5 V680 Commands

▪ 1:N Protocol

Command

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. 📖 p. 87
Process designation	Specifies the check process. "C": Check code verification "K": Check code calculation
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Check block start address	Specifies the start address of the check block in 4-digit hexadecimal. Setting range: 0000H to FFFDH
No. of check block bytes	Specifies the number of bytes in the check block in 2-digit hexadecimal. Setting range: 00H, 03H to FFH (Specify 00H for 256 bytes.) Specify the number of bytes in the check code calculation area plus two for the number of check block bytes. Refer to *Tag Memory Error Correction* for details. 📖 p. 80

Response

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.

End code	Indicates the execution result for the command. 00: Normal end, Data normal (only when verification is performed) 76: Data error warning (only when verification is performed) Refer to List of End Codes for information on other end codes. 📖 p.155
UID	A unique identifier used to identify Tags. Added only for multi-access communications designations (MT/MR).

CHECK! Refer to *Tag Memory Error Correction* for details on memory checks.
📖 p. 80
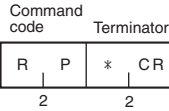
■ WRITE REPEAT (RP)
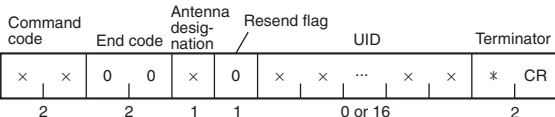
The WRITE REPEAT command is used to execute the most recently executed write command again.

▪ 1:1 Protocol

Command

Response

Note: When using the multi-access trigger communications designation (MT) for a previously exe-cuted write command, the ID controller returns an end code of 03 after communicating with all Tags.

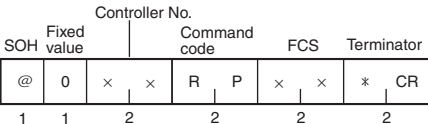| Command code	The command code is the same as the last write command that was executed.
UID	A unique identifier used to identify Tags. Added only for multi-access communications designations (MT/MR) for a previously executed write command.

Write command information is cleared at the following time.
• When the ID Controller's power supply is reset.
If a WRITE REPEAT command is executed after write command information has been cleared, a command input error will occur.

CHECK!

▪ 1:N Protocol

Command

Response

Note: When using the multi-access trigger communications designation (MT) for a previously executed write command, the ID controller returns an end code of 03 after communicating with all Tags.

Command code	The command code is the same as the last write command that was executed.
UID	A unique identifier used to identify Tags. Added only for multi-access communications designations (MT/MR) for a previously executed write command.

Write command information is cleared at the following time.
• When the ID Controller's power supply is reset.
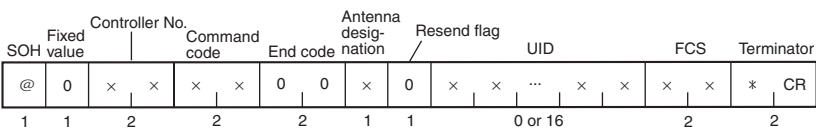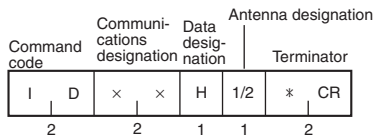If a WRITE REPEAT command is executed after write command information has been cleared, a command input error will occur.
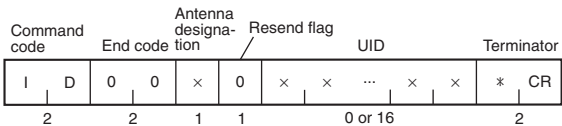
CHECK!

■ READ ID

Reads the Tag's ID code.

▪ 1:1 Protocol

Command

Command code | Communications designation | Data designation | Antenna designation | Terminator

| I | D | × | × | H | 1/2 | * | CR |
| 2 | | 2 | | 1 | 1 | | 2 |

Communications designation	Specifies the method of communications with the Tag. The selective communications designation (SL) cannot be used. Refer to *Communications Designation Function* for details on the communications designation. p. 87
Data designation	"H": This designation is fixed.
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

Response

Command code | End code | Antenna designation | Resend flag | UID | Terminator

| I | D | 0 | 0 | × | 0 | × | × | ... | × | × | * | CR |
| 2 | | 2 | | 1 | 1 | | 0 or 16 | | | 2 |

UID	A unique identifier used to identify Tags. **Note:** Not added when an error is generated.

▪ 1:N Protocol

Command

SOH | Fixed value | Controller No. | Command code | Communications designation | Data designation | Antenna designation | FCS | Terminator

| @ | 0 | × | × | I | D | × | × | H | 1/2 | × | × | * | CR |
| 1 | 1 | 2 | | 2 | | 2 | | 1 | 1 | 2 | | 2 |

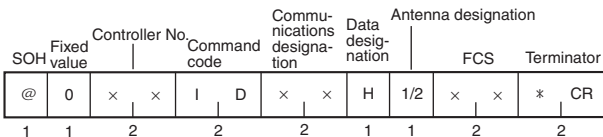| Communications designation	Specifies the method of communications with the Tag. The selective communications designation (SL) cannot be used. Refer to *Communications Designation Function* for details on the communications designation. p. 87
Data designation	"H": This designation is fixed.
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

Response

SOH | Fixed value | Controller No. | Command code | End code | Antenna designation | Resend flag | UID | FCS | Terminator

| @ | 0 | × | × | I | D | 0 | 0 | × | 0 | × | × | ... | × | × | × | × | * | CR |
| 1 | 1 | 2 | | 2 | | 2 | | 1 | 1 | | 0 or 16 | | | 2 | | 2 |

UID	A unique identifier used to identify Tags. **Note:** Not added when an error is generated.

◼ COPY (CP)

The COPY command reads data from the memory of a Tag using one Antenna and writes it to the memory of the Tag in the other Antenna's communications area. This command cannot be used with the V680-CA5D01-V2.
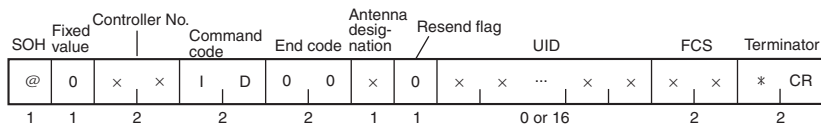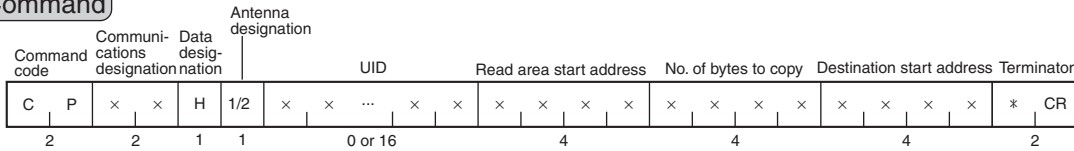
▪ 1:1 Protocol

Command

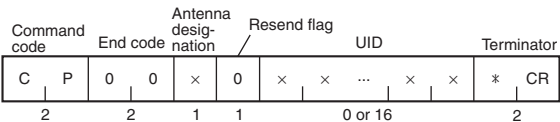| Communications designation	Specifies the method of communications with the Tag. Refer to *Communications Designation Function* for details on the communications designation. 📖 p. 87
Data designation	Always "H".
Antenna designation	Specifies the Antenna with which to communicate. "1": Reads from Antenna 1 and writes to Antenna 2. "2": Reads from Antenna 2 and writes to Antenna 1.
UID	A unique identifier used to identify Tags. Only in the case of the selective communications designation (SL), the UID of the Tag that is being written to is added to the data.
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to copy	Specifies the number of bytes of data to copy in 4-digit hexadecimal. Setting range: 0001H to 0800H
Destination start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH

> CHECK! The communications designation for the Antenna that reads data is always single trigger (ST). The communications designation specified in the command is used for the Antenna that writes data.
> For a communications designation that specifies repeating, data writing will be repeated for other Tags after data is written to the first Tag.

Response

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.

UID	A unique identifier used to identify Tags. In the case of multi-access communications designations (MT/MR), the UID of the Tag that is being written to is added to the data.

■ 1:N Protocol

Command

SOH	Fixed value	Controller No.	Command code	Communications designation	Data designation	Antenna designation	UID	Read area start address	No. of bytes to copy	Destination start address	FCS	Terminator
@	0	× ×	C P	× ×	H	1/2	× × ··· × ×	× × × ×	× × × ×	× × × ×	× ×	* CR
1	1	2	2	2	1	1	0 or 16	4	4	4	2	2

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. 📖 p. 87
Data designation	Always "H".
Antenna designation	Specifies the Antenna with which to communicate. "1": Reads from Antenna 1 and writes to Antenna 2. "2": Reads from Antenna 2 and writes to Antenna 1.
UID	A unique identifier used to identify Tags. Only in the case of the selective communications designation (SL), the UID of the Tag that is being written to is added to the data.
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to copy	Specifies the number of bytes of data to copy in 4-digit hexadecimal. Setting range: 0001$_H$ to 0800$_H$
Destination start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$

CHECK!
The communications designation for the Antenna that reads data is always single trigger (ST). The communications designation specified in the command is used for the Antenna that writes data.
For a communications designation that specifies repeating, data writing will be repeated for other Tags after data is written to the first Tag.
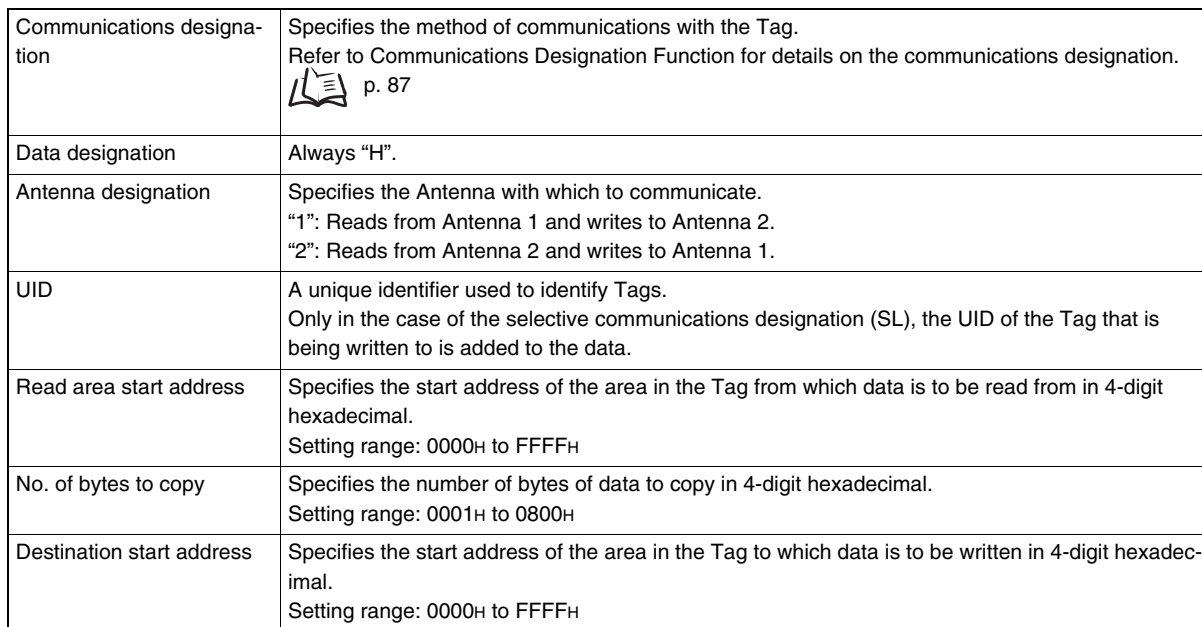
Response

SOH	Fixed value	Controller No.	Command code	End code	Antenna designation	Resend flag	UID	FCS	Terminator
@	0	× ×	C P	× ×	×	0	× × ··· × ×	× ×	* CR
1	1	2	2	2	1	1	0 or 16	2	2

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.
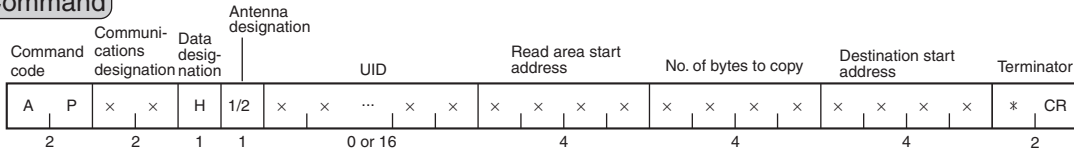
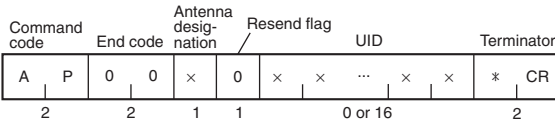| UID	A unique identifier used to identify Tags. In the case of multi-access communications designations (MT/MR), the UID of the Tag that is being written to is added to the data.

■ AUTO COPY (AP)

When the ID Controller receives an AUTO COPY command, it waits for Tags to approach and then reads data from the memory of a Tag using one Antenna and writes it to the memory of the Tag in the other Antenna's communications area. This command cannot be used with the V680-CA5D01-V2.

▪ 1:1 Protocol

Command

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. p. 87
Data designation	Always "H".
Antenna designation	Specifies the Antenna with which to communicate. "1": Reads from Antenna 1 and writes to Antenna 2. "2": Reads from Antenna 2 and writes to Antenna 1.
UID	A unique identifier used to identify Tags. Only in the case of the selective communications designation (SL), the UID of the Tag that is being written to is added to the data.
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to copy	Specifies the number of bytes of data to copy in 4-digit hexadecimal. Setting range: 0001H to 0800H
Destination start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH

The communications designation for the Antenna that reads data is always "single auto" (SA). The communications designation specified in the command is used for the Antenna that writes data.

For a communications designation that specifies repeating, data writing will be repeated for other Tags after data is written to the first Tag.
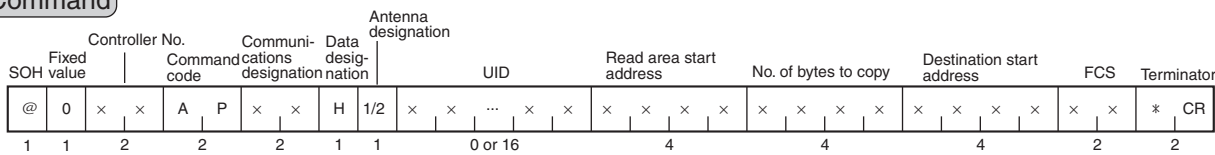
Response

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.

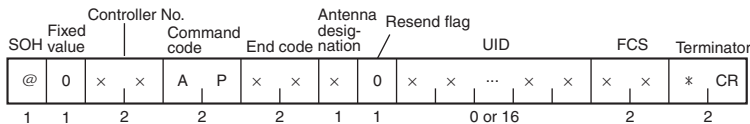| UID	A unique identifier used to identify Tags. In the case of multi-access communications designations (MT/MR), the UID of the Tag that is being written to is added to the data.

▪ 1:N Protocol

Command

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. p. 87
Data designation	Always "H".
Antenna designation	Specifies the Antenna with which to communicate. "1": Reads from Antenna 1 and writes to Antenna 2. "2": Reads from Antenna 2 and writes to Antenna 1.
UID	A unique identifier used to identify Tags. Only in the case of the selective communications designation (SL), the UID of the Tag that is being written to is added to the data.
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to copy	Specifies the number of bytes of data to copy in 4-digit hexadecimal. Setting range: 0001H to 0800H
Destination start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH

CHECK! The communications designation for the Antenna that reads data is always "single auto" (SA). The communications designation specified in the command is used for the Antenna that writes data.

For a communications designation that specifies repeating, data writing will be repeated for other Tags after data is written to the first Tag.

Response

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.
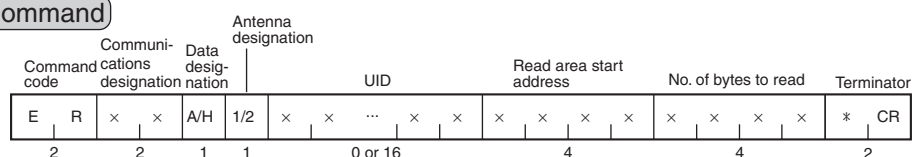
UID	A unique identifier used to identify Tags. In the case of multi-access communications designations (MT/MR), the UID of the Tag that is being written to is added to the data.

■ LARGE READ (ER)

The LARGE READ command reads up to 8 Kbytes of data from a Tag. If there is no Tag, the ID Controller returns an error response with an error code of 72 (Tag missing error).
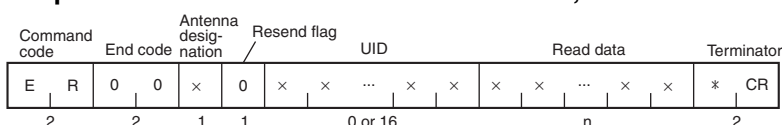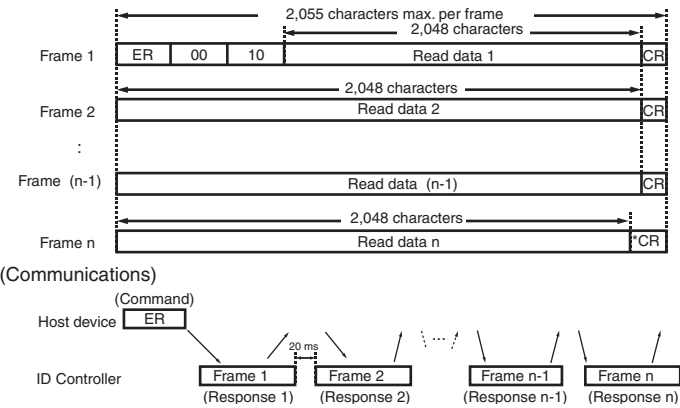
▪ 1:1 Protocol

Command

Communications designation	Specifies the method of communications with the Tag.
	Communications designations other than single trigger (ST), single auto (SA), single input trigger (SI), and selective (SL) cannot be used.
	Refer to Communications Designation Function for details on the communications designation.
	p. 87
Data designation	Specifies the code format when sending the read data response.
	"A": ASCII
	"H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate.
	"1": Antenna 1
	"2": Antenna 2
UID	A unique identifier used to identify Tags.
	Added only for the selective communications designation (SL).
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal.
	Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal.
	Up to 8,192 bytes can be read with one command.
	Setting range: 0001$_H$ to 2000$_H$
	• 1000 Byte Tags (V680-D1KP@@) • 2000 Byte Tags (V680-D2KF@@)
	ASCII: 1000 bytes (1000 characters) ASCII: 2000 bytes (2000 characters)
	Hexadecimal: 1000 bytes (2000 characters) Hexadecimal: 2000 bytes (4000 characters)
	• 8k/32k Byte Tags (V680-D8KF68/-D32KF68)
	ASCII: 8192 bytes (8192 characters)
	Hexadecimal: 8192 bytes (16384 characters)

Response

Response When the Read Data Consists of 2,048 or Fewer Characters

Response When the Read Data Consists of More Than 2,048 Characters

UID	Added when the ADD UID (US) command is set to add a UID, or when a multi-access communications designation (MT/MR) is specified.
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

- 1:N Protocol

Command
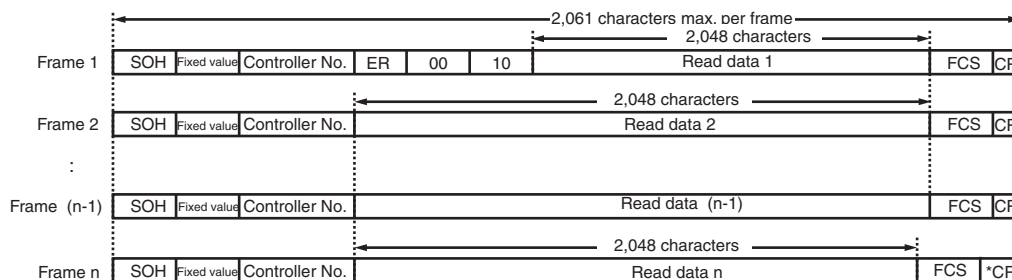

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. p. 87	
Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal	
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2	
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).	
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH	
No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal. Up to 8,192 bytes can be read with one command. Setting range: 0001H to 2000H	

- 1000 Byte Tags (V680-D1KP@@)
  ASCII: 1000 bytes (1000 characters)
  Hexadecimal: 1000 bytes (2000 characters)
- 8k/32k Byte Tags (V680-D8KF68/-D32KF68)
  ASCII: 8192 bytes (8192 characters)
  Hexadecimal: 8192 bytes (16384 characters)

- 2000 Byte Tags (V680-D2KF@@)
  ASCII: 2000 bytes (2000 characters)
  Hexadecimal: 2000 bytes (4000 characters)

Response

Response When the Read Data Consists of 2,048 or Fewer Characters

Response When the Read Data Consists of More Than 2,048 Characters

(Communications)

UID	Added when the ADD UID (US) command is set to add a UID, or when a multi-access communications designation (MT/MR) is specified.
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

■ READ TAG MEMORY ERROR CORRECTION (QR)

Reads Tag data from the area written by the WRITE TAG MEMORY ERROR CORRECTION (QW) command, and performs 1-bit error correction. Be sure to read the same area that was written by the QW command.

▪ 1:1 Protocol
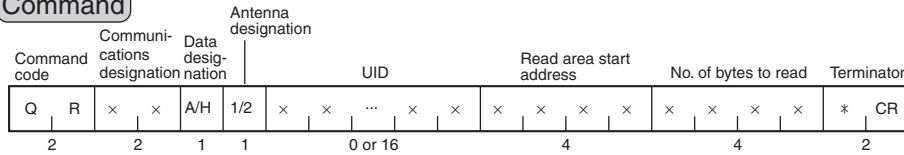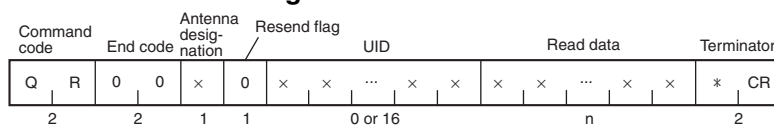
Command

Command code	Communications designation	Data designation	Antenna designation	UID	Read area start address	No. of bytes to read	Terminator
Q R	× ×	A/H	1/2	× × ··· × ×	× × × ×	× × × ×	＊ CR
2	2	1	1	0 or 16	4	4	2

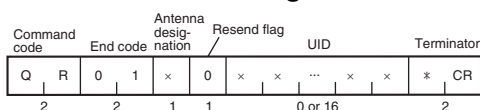| Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. 📖 p. 87
Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFAH
No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal. Up to 510 bytes can be read with one command. Setting range: 0001H to 01FEH • ASCII: 510 bytes (510 characters) • Hexadecimal: 510 bytes (1,020 characters)

Response

Communications Designation Other Than PA or PI

Command code	End code	Antenna designation	Resend flag	UID	Read data	Terminator
Q R	0 0	×	0	× × ··· × ×	× × ··· × ×	＊ CR
2	2	1	1	0 or 16	n	2

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.

Communications Designation of PA or PI

Command code	End code	Antenna designation	Resend flag	UID	Terminator
Q R	0 1	×	0	× × ··· × ×	＊ CR
2	2	1	1	0 or 16	2

Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2 **Note:** If a host communications error (other than error code 15) is generated, a "0" will be added.
UID	Added when the ADD UID (US) command is set to add a UID, or when a multi-access communications designation (MT/MR) is specified.
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

■ 1:N Protocol

Command

		Controller No.		Communi-	Data	Antenna designation								
SOH	Fixed value		Command code	cations designation	desig- nation			UID		Read area start address	No. of bytes to read		FCS	Terminator
@	0	× ×	Q R	× ×	A/H	1/2	× × ⋯ × ×		× × × ×	× × × ×	× × × ×	× ×	∗	CR
1	1	2	2	2	1	1	0 or 16		4		4	2		2

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. 📖 p. 87
Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal. Up to 510 bytes can be read with one command. Setting range: 0001H to 01FEH • ASCII: 510 bytes (510 characters) • Hexadecimal: 510 bytes (1,020 characters)

Response

Communications Designation Other Than PA or PI

		Controller No.			Antenna desig-	Resend flag						
SOH	Fixed value		Command code	End code	nation		UID		Read data		FCS	Terminator
@	0	× ×	Q R	0 0	×	0	× × ⋯ × ×		× × ⋯ × ×		× ×	∗ CR
1	1	2	2	2	1	1	0 or 16		n		2	2

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.

Communications Designation of PA or PI

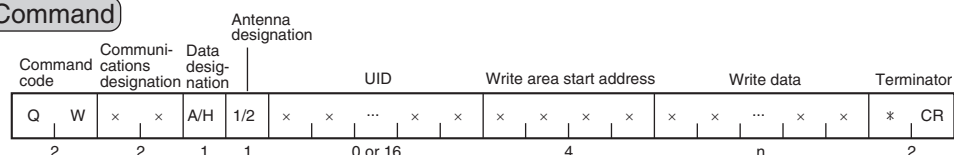|		Controller No.			Antenna desig-	Resend flag				
SOH	Fixed value		Command code	End code	nation		UID		FCS	Terminator
@	0	× ×	Q R	0 1	×	0	× × ⋯ × ×	× ×	∗	CR
1	1	2	2	2	1	1	0 or 16	2		2

Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2 **Note:** If a host communications error (other than error code 15) is generated, a "0" will be added.
UID	Added when the ADD UID (US) command is set to add a UID, or when a multi-access communications designation (MT/MR) is specified.
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

SECTION 5   V680 Commands

■ WRITE TAG MEMORY ERROR CORRECTION (QW)

Writes data to a Tag. A tag memory check and 5-byte error correct code are written consecutively after the written data. Do not change this code, as it is required by the READ TAG MEMORY ERROR COR-RECTION (QR) command.
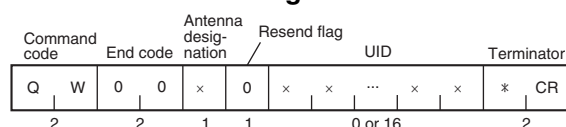
▪ 1:1 Protocol

Command

Command code	Communi-cations designation	Data desig-nation	Antenna designation	UID	Write area start address	Write data	Terminator
Q W	× ×	A/H	1/2	× × ··· × ×	× × × ×	× × ··· × ×	* CR
2	2	1	1	0 or 16	4	n	2

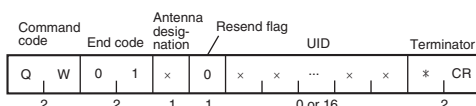| Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. 📖 p. 87
Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFAH
No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal. Up to 510 bytes can be read with one command. Setting range: 0001H to FFFAH • ASCII: 510 bytes (510 characters) • Hexadecimal: 510 bytes (1020 characters)

Response

Communications Designation Other Than PA or PI

Command code	End code	Antenna desig-nation	Resend flag	UID	Terminator
Q W	0 0	×	0	× × ··· × ×	* CR
2	2	1	1	0 or 16	2

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.

Communications Designation of PA or PI

Command code	End code	Antenna desig-nation	Resend flag	UID	Terminator
Q W	0 1	×	0	× × ··· × ×	* CR
2	2	1	1	0 or 16	2

UID	Added when the ADD UID (US) command is set to add a UID, or when a multi-access communi-cations designation (MT/MR) is specified.

▪ 1:N Protocol

Command

Communications designation	Specifies the method of communications with the Tag. Refer to Communications Designation Function for details on the communications designation. 📖 p. 87
Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
UID	A unique identifier used to identify Tags. Added only for the selective communications designation (SL).
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFAH
No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal. Up to 510 bytes can be read with one command. Setting range: 0001H to FFFAH • ASCII: 510 bytes (510 characters) • Hexadecimal: 510 bytes (1,020 characters)

Response

Communications Designation Other Than PA or PI

Note: When using the multi-access trigger communications designation (MT), the ID controller returns an end code of 03 after communicating with all Tags.
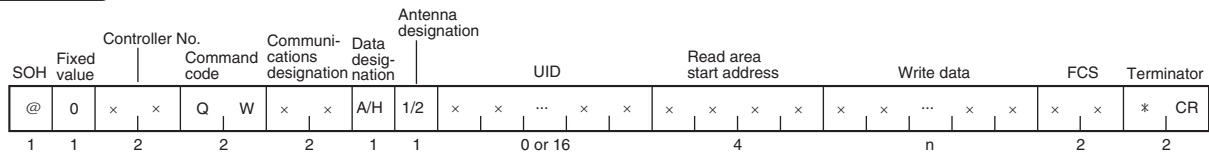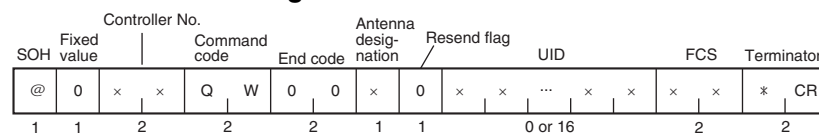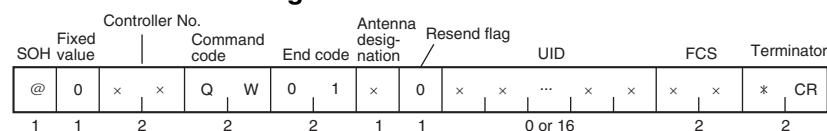
Communications Designation of PA or PI

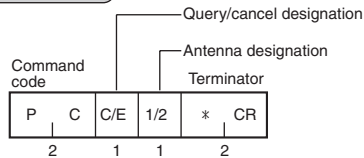| UID	Added when the ADD UID (US) command is set to add a UID, or when a multi-access communications designation (MT/MR) is specified.

Communications Subcommands

Communications subcommands are used in combination with commands for Tag communications.

They cannot be used by themselves to communicate with a Tag.
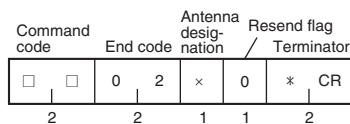
■ POLLING QUERY (PC)

▪ 1:1 Protocol

(Command)

Query/cancel designation

Antenna designation

Command code · Terminator

P	C	C/E	1/2	*	CR
2		1	1		2

Query/cancel designation	Specifies querying or canceling polling auto processing. "C": Processing results query "E": Processing cancelled.
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

Response When a Processing Results Query Is Executed after Tag Communications

The ID Controller returns a response according to the specifications of the polling command that was executed.

Response When a Processing Results Query Is Executed before Tag Communications
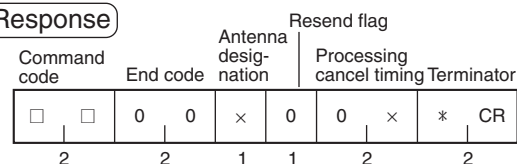
(Response)

Command code · End code · Antenna designation · Resend flag · Terminator

□	□	0	2	×	0	*	CR
2		2		1	1		2

Command code	The command code is the same as the only specified when polling processing was executed.

Response When Cancelling Processing Results

(Response)

Command code · End code · Antenna designation · Resend flag · Processing cancel timing · Terminator

□	□	0	0	×	0	0	×	*	CR
2		2		1	1	2			2

Command code	The command code is the same as the only specified when polling processing was executed.
Processing cancel timing	Indicates the timing when polling processing was cancelled. "00": There was no Tag in the communications area when polling processing was cancelled. "01": Communications were in progress with the Tag or processing had been completed when polling processing was cancelled.

Response for a Processing Results Query for an Antenna That Is Not Executing Polling Processing

(Response)

Command code · End code · Antenna designation · Resend flag · Terminator

P	C	1	5	×	0	*	CR
2		2		1	1		2

▪ 1:N Protocol

Command

Query/cancel designation	Specifies querying or canceling polling auto processing. "C": Processing results query "E": Processing results cancel
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

Response When a Processing Results Query Is Executed after Tag Communications
The ID Controller returns a response according to the specifications of the polling command that was executed.

Response When a Processing Results Query Is Executed before Tag Communications
Response

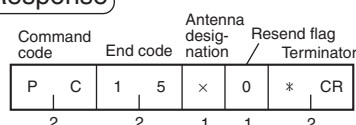| Command code	The command code is the same as the only specified when polling processing was executed.

Response When Cancelling Processing Results
Response

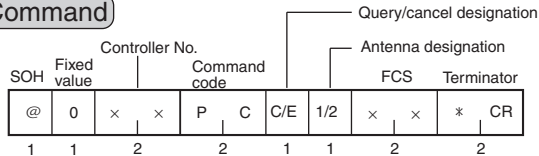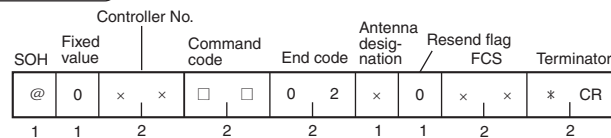| Command code	The command code is the same as the only specified when polling processing was executed.
Processing cancel timing	Indicates the timing when polling processing was cancelled. "00": There was no Tag in the communications area when polling processing was cancelled. "01": Communications were in progress with the Tag or processing had been completed when polling processing was cancelled.

Response for a Processing Results Query for an Antenna That Is Not Executing Polling Processing
Response

■ COMMAND PROCESSING TERMINATE (AA)

The COMMAND PROCESSING TERMINATE command cancels any command except for polling commands and returns the ID Control to command standby status.

▪ 1:1 Protocol

Command

Antenna designation

	Command code		Process designation	Antenna designation	Terminator	
	A	A	0	1/2	＊	CR
	2		1	1	2	

Response

Resend flag / Processing cancel timing

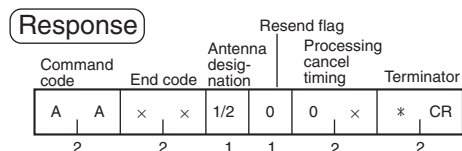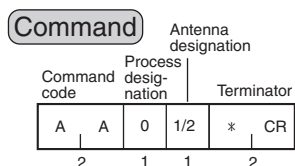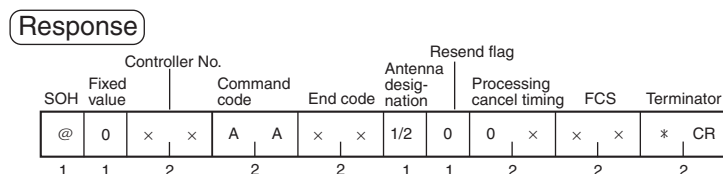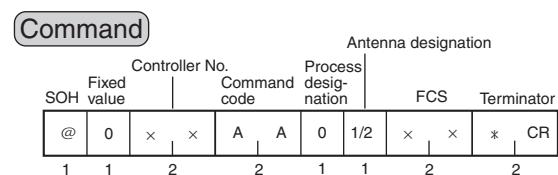|	Command code		End code		Antenna designation	Resend flag	Processing cancel timing		Terminator	
	A	A	×	×	1/2	0	0	×	＊	CR
	2		2		1	1	2		2	

Processing cancel timing	Indicates the timing when polling processing was cancelled.
	"00": Command was cancelled before a Tag was detected.
	"01": Command was cancelled after a Tag was detected.

▪ 1:N Protocol

Command

Antenna designation

SOH	Fixed value	Controller No.		Command code		Process designation	Antenna designation	FCS		Terminator	
@	0	×	×	A	A	0	1/2	×	×	＊	CR
1	1	2		2		1	1	2		2	

Response

Resend flag

SOH	Fixed value	Controller No.		Command code		End code		Antenna designation	Resend flag	Processing cancel timing		FCS		Terminator	
@	0	×	×	A	A	×	×	1/2	0	0	×	×	×	＊	CR
1	1	2		2		2		1	1	2		2		2	

Processing cancel timing	Indicates the timing when polling processing was cancelled.
	"00": Command was cancelled before a Tag was detected.
	"01": Command was cancelled after a Tag was detected.

■ ABORT (XZ)

The ABORT command can be used to reset the ID Controller to command standby status during communications with the host device or a Tag if any sort of trouble occurs, e.g., if the ID Controller does not return a response. The ID Controller will return to command standby status after it is reset. The ID Controller does not return a response to the ABORT command.

▪ 1:1 Protocol

Command

Command code		Terminator	
X	Z	∗	CR
2		2	

About 100 ms is required after the ID Controller receives the ABORT command before it can receive the next command.

CHECK!

▪ 1:N Protocol

Command

		Controller No.								
SOH	Fixed value			Command code		FCS		Terminator	
@	0	×	×	X	Z	×	×	∗	CR
1	1	2		2		2		2	

About 100 ms is required after the ID Controller receives the ABORT command before it can receive the next command.

CHECK!

CONTROLLER CONTROL Commands

■ UID ADDITION SET (US)

Sets whether or not UID should be added to the read command (RD) response.

▪ 1:1 Protocol

Command

```
        Process
Command desig-  Fixed
code    nation  value   Terminator
 U   S   ×    0     *    CR
   2      1      1       2
```

Process designation	Specify whether or not to add a UID.
	"0": Do not add a UID
	"1" Add a UID

Response

```
Command              Fixed   Resend flag
code       End code  value   /   Terminator
 U   S   0    0   0    0     *    CR
   2       2     1    1       2
```

▪ 1:N Protocol

Command

```
                                Process
          Controller No.        desig-  Fixed
    Fixed             Command    nation  value   FCS        Terminator
SOH value             code
 @   0   ×    ×   U   S   ×    0   ×    ×    *    CR
 1   1     2      2      1   1     2         2
```

Process designation	Specify whether or not to add a UID.
	"0": Do not add a UID
	"1" Add a UID

Response

```
       Controller No.
    Fixed          Command         Fixed   Resend flag
SOH value          code    End code value  /   FCS    Terminator
 @   0   ×    ×   U   S   0    0   0    0   ×    ×    *   CR
 1   1     2      2      2     1   1     2        2
```

■ COMMUNICATIONS SET (TR)

The COMMUNICATIONS SET command is used to set serial communications parameters. To use the ID Controller with the new parameters, either restart the ID Controller or execute the ABORT command (XZ).

CHECK! This command is valid only when internal settings are enabled (i.e., when pin 1 on SW3 is ON).

▪ 1:1 Protocol

Command

Baud rate designation	Specify the baud rate. "3": 9,600 bps "4": 19,200 bps "5": 38,400 bps "6": 115,200 bps Default setting: 9,600 bps
Data length designation	Specify the data length. "7": 7 bits "8": 8 bits Default setting: 7 bits
Parity	Specify the type of parity. "0": None "1": Odd parity "2": Even parity Default setting: Even parity
Stop bit length	Specify the number of stop bits. "1": 1 bit "2": 2 bits Default setting: 2 bits

Response

SECTION 5   V680 Commands

▪ 1:N Protocol

Command

Baud rate designation	Specify the baud rate. "3": 9,600 bps "4": 19,200 bps "5": 38,400 bps "6": 115,200 bps Default setting: 9,600 bps
Data length designation	Specify the data length. "7": 7 bits "8": 8 bits Default setting: 7 bits
Parity	Specify the type of parity. "0": None "1": Odd parity "2": Even parity Default setting: Even parity
Stop bit length	Specify the number of stop bits. "1": 1 bit "2": 2 bits Default setting: 2 bits

Response

■ PARAMETER SET (SP)

The PARAMETER SET command is used to set conditions for communicating with Tags. The various parameters are set in the ID Controller.

CHECK! The ID Controller does not need to be reset when internal settings are changed. The new settings are effective immediately.

CHECK! A memory error will occur if the power supply is interrupted while parameters are being changed.

▪ 1:1 Protocol

Command

Process code (Upper digit)	Specifies the process to perform for the parameter. "0": Change internal setting. "1": Read internal setting. "9": Return initial setting to default value.	
Process code (Lower digit)	Specifies the parameter. "1": Controller No. (See note.) "2": Write verification enable (See note.) "3": Reception sensitivity "4": Auto command cancel time "6": Response delay time "7": No. of retries for Tag communications "8": Inter-character monitoring time "9": Tag communications procedure (See note.) "C": Error output time "D": Number of test bytes setting "E": Tag history noise detection enable (Noise monitor function setting) "F": Output contact mode setting "G": Noise detection count setting "H": Write protection setting (See note.)	**Note:** Parameters 1, 2, 9, and H are valid only when internal settings are enabled (i.e., when pin 1 on SW3 is ON).
Parameter data (when there are changes)	Data No. (See note.)	Settable values
	"1"	Specify 2 decimal digits. "00" to "31" (unit number) Default value: "00"
	"2"	"0": Without verification "1"With verification (default value)
	"3"	"0": Weak "1": Standard (default value)
	"4"	Specify 2 decimal digits. "00" to "99" (s) "00": No monitoring, Default value: "00" (s)
	"6"	Specify 2 decimal digits. "00" to "99" ms) "00": No delay, Default value: "20" (ms)
	"7"	Specify 2 decimal digits. "00" to "99" (times) "00": No retries, Default value: "09" (times)
	"8"	Specify 4 decimal digits. "0000" to "9999" (ms) "0000": No monitoring, Default value: "0099" (ms)
	"9"	"00": 1:1 protocol (default value) "01": 1:N protocol

Parameter data (when there are changes)	Data No. (See note.)	Settable values
	"C"	Specify 4 decimal digits. "0000" to "9999" (ms) "0000": Infinite, Default value: "0500" (ms)
	"D"	Specify 4 hexadecimal digits. "0001" to "0800" (bytes) Default value: "0001" (bytes)

	"E"	"00": No noise detection for communications history (default value)
		      Noise monitor function disabled.
		"01": Noise detection for communications history
		      Noise monitor function enabled.

	"F"	"00": Two Output Mode
		      BUSY, ERROR, OUT1, and OUT2 (default value)
		"01": Four Output Mode
		      OUT1, OUT2, OUT3, and OUT4

	"G"	Specify 4 decimal digits. "0001" to "0100" (times) Default value: "0010" (times)
	"H"	"00": Write protection OFF "01": Write protection ON (default value)

Note: The data number of the parameter data is the number specified for the lower digit of the process code.

The settable values for the data number are the same as for the parameter specified by the lower digit of the process code.

Response

Parameter data	Attached only when parameter data is being obtained.

▪ 1:N Protocol

Command

Process code (Upper digit)	Specifies the process to perform for the parameter. "0": Change internal setting. "1": Read internal setting. "9": Return initial setting to default value.	
Process code (Lower digit)	Specifies the parameter. "1": Controller No. (See note.) "2": Write verification enable (See note.) "3": Reception sensitivity "4": Auto command cancel time "6": Response delay time "7": No. of retries for Tag communications "8": Inter-character monitoring time "9": Tag communications procedure (See note.) "C": Error output time "D": Number of test bytes setting "E": Tag history noise detection enable 　　(Noise monitor function setting) "F": Output contact mode setting "G": Noise detection count setting "H": Write protection setting (See note.)	**Note:** Parameters 1, 2, 9, and H are valid only when internal settings are enabled (i.e., when pin 1 on SW3 is ON).
Parameter data (when there are changes)	Data No. (See note.)	Settable values
	"1"	Specify 2 decimal digits. "00" to "31" (unit number) Default value: "00"
	"2"	"0": Without verification "1"With verification (default value)
	"3"	"0": Weak "1": Standard
	"4"	Specify 2 decimal digits. "00" to "99" (s) "00": No monitoring, Default value: "00" (s)
	"6"	Specify 2 decimal digits. "00" to "99" (ms) "00": No delay, Default value: "20" (ms)
	"7"	Specify 2 decimal digits. "00" to "99" (times) "00": No retries, Default value: "09" (times)
	"8"	Specify 4 decimal digits. "0000" to "9999" (ms) "0000": No monitoring, Default value: "0099" (ms)
	"9"	"00": 1:1 protocol (default value) "01": 1:N protocol
	"C"	Specify 4 decimal digits. "0000" to "9999" (ms) "0000": Infinite, Default value: "0500" (ms)
	"D"	Specify 4 hexadecimal digits. "0001" to "0800" (bytes) Default value: "0001" (bytes)
	"E"	"00": No noise detection for communications history (default value) 　　Noise monitor function disabled. "01": Noise detection for communications history 　　Noise monitor function enabled.

Parameter data (when there are changes)	Data No. (See note.)	Settable values
	"F"	"00": Two Output Mode 　　　BUSY, ERROR, OUT1, and OUT2 (default value) "01": Four Output Mode 　　　OUT1, OUT2, OUT3, and OUT4
	"G"	Specify 4 decimal digits. "0001" to "0100" (times) Default value: "0010" (times)
	"H"	"00": Write protection OFF "01": Write protection ON (default value)

Note: The data number of the parameter data is the number specified for the lower digit of the process code.
The settable values for the data number are the same as for the parameter specified by the lower digit of the process code.

Response

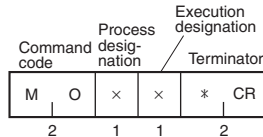| Parameter data	Attached only when parameter data is being obtained.

■ OPERATION MODE CHANGE (MO)

The OPERATION MODE CHANGE command is used to change the mode of the ID Controller.

▪ 1:1 Protocol

Command

Process designation	Specifies the operation mode of the ID Controller. S: Self Execution Mode C: Command Execution Mode P: Host Communications Monitor Mode
Execution designation	Always "0".

CHECK! Before changing the operation mode to Self Execution Mode, use the OPERATION CONDITION SET command to set the operation conditions. If the OPERATION MODE CHANGE command is executed with the process designation set to "S" when the operation conditions have not been set, an execution status error (end code 15) will occur.
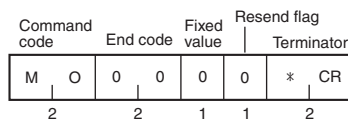
p. 137

CHECK! If the OPERATION MODE CHANGE command is executed in Host Communications Monitor Mode with the process designation set to "S," an execution status error (end code 15) will occur. To change from Host Communications Monitor Mode to Self Execution Mode, first change to Command Execution Mode.

Response

▪ 1:N Protocol

Command

Process designation	Specifies the operation mode of the ID Controller. S: Self Execution Mode C: Command Execution Mode P: Host Communications Monitor Mode
Execution designation	Always "0".

CHECK! Before changing the operation mode to Self Execution Mode, use the OPERATION CONDITION SET command to set the operation conditions. If the OPERATION MODE CHANGE command is executed with the process designation set to "S" when the operation conditions have not been set, an execution status error (end code 15) will occur.
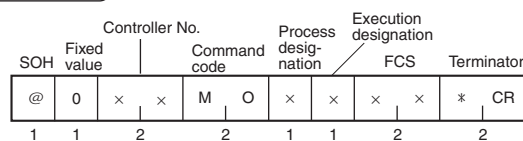
p. 137

CHECK! If the OPERATION MODE CHANGE command is executed in Host Communications Monitor Mode with the process designation set to "S," an execution status error (end code 15) will occur. To change from Host Communications Monitor Mode to Self Execution Mode, first change to Command Execution Mode.

Response

		Controller No.						Fixed value	Resend flag				

■ OPERATION CONDITION SET (SE)

The OPERATION CONDITION SET command is used to set operation conditions for the Self Execution Mode. Always set the operation conditions in the following order from 1 to 5.

1. Clear the Operation Conditions

Command

Command code	Process code		Terminator	
S E	2	0	＊	CR
2	2		2	

Process code	Always "20".

Response

Command code	End code	Fixed value	Resend flag	Terminator	
S E	× ×	0	0	＊	CR
2	2	1	1	2	

2. Set the Execution Command

Command

Command code	Process code	Operation condition parameter	Execution Command	Terminator	
S E	0 0	× ×	× × ··· × ×	＊	CR
2	2	2	n	2	

Process code	Always "00".
Operation condition parameter	"C1": Sets an execution command for channel 1. "C2": Sets an execution command for channel 2. **Note:** "C2" will result in an error (15) if specified for a One-channel Controller (V680-CA5D01-V2). Also, if execution commands are not set for both channels 1 and 2 for a Two-channel Controller (V680-CA5D02-V2), the output conditions cannot be set.
Execution command string	Specifies the command to be executed, with the following restrictions. 1. Only Tag communications commands can be set: RD, WT, DF, or MD. 2. The communications designation must be RA or RI. 3. A maximum of 256 bytes can be written (for either ASCII or hexadecimal data) The execution command will be set to "XX" if the execution command string is omitted.

Response

Command code	End code	Fixed value	Resend flag	Terminator	
S E	× ×	0	0	＊	CR
2	2	1	1	2	

SECTION 5 V680 Commands

3. Set the Output Conditions

Command

Command code	Process code	Operation condition parameter	Comparison antenna	Condition A	Comparison parameter A	Operator	Condition B	Comparison parameter B	Output parameter	Terminator
S E	0 0	× ×	× ×	× ×	× ··· ×	× ×	× ×	× ··· ×	× × × ×	∗ CR
2	2	2	2	2	n	2	2	n	4	2

Note: There are the following three patterns for comparison conditions A and B depending on the conditions.

- When Data Criteria Are Used for Conditions A and B

Comparison parameters A and B	Number of data bytes A and B	Comparison parameters A and B
× × × ×	× ×	× ··· ×
4	2	n

- When "ER" Is Specified as the Communications Criteria for Conditions A and B

Comparison parameters A and B
× × × × × × × ×
8

- When "OK" or "AL" Is Specified as the Communications Judgements Conditions A and B
  There are no parameters in this case.

Process code		Always "00".
Operation condition parameter		"S1": OUT1 output condition setting "S2": OUT2 output condition setting "S3": OUT3 output condition setting "S4": OUT4 output condition setting **Note:** "S3" or "S4" will result in an error (15) in Two Output Mode. Also, if output conditions are not set for OUT1 through OUT3, the execution command output destination cannot be set.
Comparison antenna		"01": Compare to channel 1 "02": Compare to channel 2 "XX": No output
Conditions A and B	Data criteria	"==": Criteria data match, "!=": Criteria data does not match, ">=": Equal to or higher than criteria, "<=" Equal to or less than criteria, Data criteria can be used only for READ commands.
	Communications criteria	"OK": Communication OK, "ER": Communications error, "AL": Always
Data offsets A and B		Specifies the offset to the portion of the read data to use as the criteria. Setting range: 0000$_H$ to FFFF$_H$
Number of data bytes A and B		Specifies the number of bytes to use as the criteria. Setting range: 01$_H$ to 10$_H$
Comparison parameters A and B	When conditions A and B are data criteria	Specifies the comparison data to use as the data criteria. (The same length as the designated number of data bytes for either ASCII and hexadecimal data.)
	When conditions A and B are "ER" communications criteria	Specifies the error code. "00000000" specifies all error codes. Example: "707A0000"specifies a Tag communications error and address error.
Operator		Operator between condition A and condition B "&&": AND, "++": OR
Output parameter		Specifies the output ON time in milliseconds. Setting range: "0001" to "9999" (ms), ("0000": Hold until next judgment)

Response

Command code	End code	Fixed value	Resend flag	Terminator
S E	× ×	0	0	∗ CR
2	2	1	1	2

4. Set the Output Destination for the Execution Command

Command

Note: There are the following three patterns for comparison conditions A and B depending on the conditions.

• When Data Criteria Are Used for Conditions A and B

• When "ER" Is Specified as the Communications Criteria for Conditions A and B

• When "OK" or "AL" Is Specified as the Communications Judgements Conditions A and B

There are no parameters in this case.

Process code	Always "00".
Operation condition parameter	"U1": Sets the output destination for the execution command for channel 1. "U2": Sets the output destination for the execution command for channel 2. **Note:** "U2" will result in an error (15) if specified for a One-channel Controller (V680-CA5D01-V2). For a Two-channel Controller (V680-CA5D02-V2), set the execution command output destination for both channels 1 and 2.
Host communications output destination	"01": Output from RS-232C. "02": Output from RS-485. "03": Output from USB. "XX": Do not output.
Conditions A and B — Data criteria	"==": Criteria data match, "!=": Criteria data does not match, ">=": Equal to or higher than criteria, "<=": Equal to or less than criteria, Data criteria can be used only for READ commands.
Conditions A and B — Communications criteria	"OK": Communication OK, "ER": Communications error, "AL": Always
Data offsets A and B	Specifies the offset to the portion of the read data to use as the criteria. Setting range: 0000_H to $FFFF_H$
Number of data bytes A and B	Specifies the number of bytes to use as the criteria. Setting range: 01_H to 10_H
Comparison parameters A and B — When conditions A and B are data criteria	Specifies the comparison data to use as the data criteria. (The same length as the designated number of data bytes for either ASCII and hexadecimal data.)
Comparison parameters A and B — When conditions A and B are "ER" communications criteria	Specifies the error code. "00000000" specifies all error codes. Example: "707A0000" specifies a Tag communications error and address error.
Operator	Operator between condition A and condition B "&&": AND, "++": OR

Response

5. Read the Output Conditions

Command

Command code	Process code	Terminator
S	E	1	0	∗	CR
2	2	2

Process code	Always "10".

Response

Command code	End code	Fixed value	Resend flag	Read data	Terminator
S	E	×	×	0	0	C1⋯;C2⋯;S1⋯;S2⋯;S3⋯;S4⋯;U1⋯;U2⋯	∗	CR
2	2	1	1	n	2

Read data	"XX" will be output for parameters that are not used for a One-channel Controller (V680-CA5D01-V2) or in Two Output Mode. If a condition is not set, " " (no setting) will be output.

▪ Setting Procedure

Always use the following procedure to set operation conditions.

---

1. Clear the operation conditions.

Command: SE20*[CR]

Response SE0000*[CR]

2. Set the command string to execute.

Channel 1 Command String (Reads 10H bytes starting from address 0010H from channel 1 with an RA communications designation.)

Command: SE00C1RDRAH100100010*[CR]

Response SE0000*[CR]

Channel 2 Command String (No Setting)

Command: SE00C2XX*[CR] Note: For the V680-CA5D01-V2, this would produce a format error (end code: 14).

Response SE0000*[CR]

> With the V680-CA5D02-V2, always set a command string even if there is no execution command to be executed.
> If execution commands are not set for both channel 1 and channel 2, outputs and conditions will not be set.
> For the V680-CA5D01-V2, set an execution command only for channel 1.
>
> CHECK!

3. Set the conditions.

OUT1 Output Condition (Turn ON output OUT1 for 100 ms if the 2 bytes of data from 0000 bytes of the data read from channel 1 is greater than 1234.)

Command: SE00S101>=00000212340100*[CR]

Response SE0000*[CR]

OUT2 Output Condition (Turn ON output OUT2 for 100 ms for any error for channel 1.)

Command: SE00S201ER000000000100*[CR]

Response SE0000*[CR]

OUT3 Output Condition (No Setting)

Command: SE00S3XX*[CR]

Note: OUT3 cannot be set in Two Output Mode . An execution condition error (end code: 15) would occur.

Response SE0000*[CR]

OUT4 Output Condition (No Setting)

Command: SE00S4XX*[CR]

Note: OUT4 cannot be set in Two Output Mode . An execution condition error (end code: 15) would occur.

Response SE0000*[CR]

4. Set the output destination.

Channel 1 Execution Command Output Setting (Always output the execution command for channel 1 from RS-232C.)

Command: SE00U101AL*[CR]

Response SE0000*[CR]

Channel 2 Execution Command Output Setting (No Setting)

Command: SE00U2XX*[CR] **Note:** For the V680-CA5D01-V2, this would produce a format error (end code: 14).
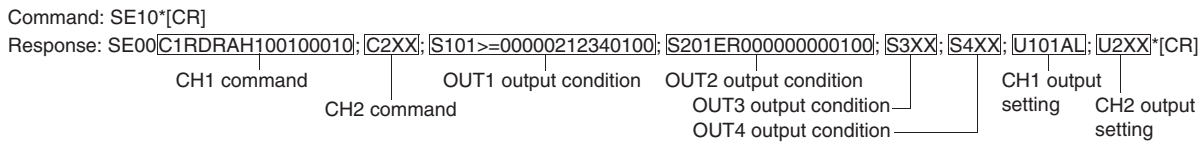
Response SE0000*[CR]

> With the V680-CA5D02-V2, always set a command string for both channel 1 and channel 2 even if there is no execution command to be executed.
>
> CHECK!

5. Read the operation conditions.

Reading Operation Conditions

Command: SE10*[CR]

Response: SE00 C1RDRAH100100010 ; C2XX ; S101>=00000212340100 ; S201ER000000000100 ; S3XX ; S4XX ; U101AL ; U2XX *[CR]

        CH1 command   OUT1 output condition OUT2 output condition   CH1 output

           CH2 command   OUT3 output condition   setting CH2 output

                                       OUT4 output condition   setting
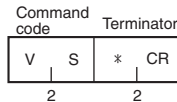
■ RESPONSE RESEND (RR)

The RESPONSE RESEND command causes the ID Controller to resend the most recent response.

CHECK! The RESPONSE RESEND command cannot be used to reset a response for the LARGE READ (ER) command.

▪ 1:1 Protocol

Command

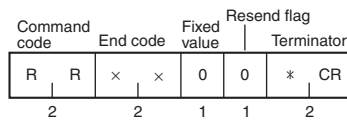| Command code		Terminator	
V	S	＊	CR
2		2	

When There Was an Immediately Preceding Response

The ID Controller resends the most recent response, but sets the Resend Flag to "1". The response

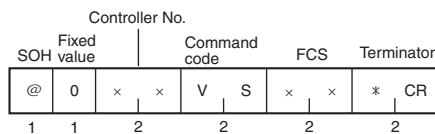formats are the same as for the individual commands.

When There Was No Immediately Preceding Response

Response

Command code		End code		Fixed value	Resend flag	Terminator	
R	R	×	×	0	0	＊	CR
2		2		1	1	2	

▪ 1:N Protocol

Command

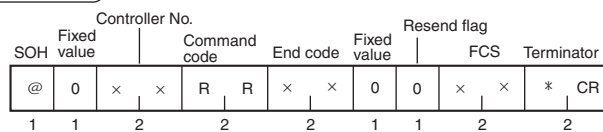| SOH	Fixed value	Controller No.		Command code		FCS		Terminator	
@	0	×	×	V	S	×	×	＊	CR
1	1	2		2		2		2	

When There Was an Immediately Preceding Response

The ID Controller resends the most recent response, but sets the Resend Flag to "1".

The response formats are the same as for the individual commands.

When There Was No Immediately Preceding Response

Response

SOH	Fixed value	Controller No.		Command code		End code		Fixed value	Resend flag	FCS		Terminator	
@	0	×	×	R	R	×	×	0	0	×	×	＊	CR
1	1	2		2		2		1	1	2		2	

■ CONTROLLER CONTROL (CC)

The CONTROLLER CONTROL command is used to manipulate or read I/O.

▪ 1:1 Protocol

Command

OUT1/OUT2 controls	0: Read 1: Turn ON 2: Turn OFF

OUT3/OUT4 controls	Output setting: Two Output Mode (BUSY, ERROR, OUT1, and OUT2)
	    Always "0".
	Output setting: Four Output Mode (OUT1, OUT2, OUT3, and OUT4)
	    0: Read
	    1: Turn ON
	    2: Turn OFF

Response

TRG1/2 Input status	The current input status 0: OFF 1: ON
OUT1/2 Output status	The output status of OUT1 and OUT2 after execution. 0: OFF 1: ON

OUT3/4 Output status	The output status of OUT3 and OUT4 after execution.
	• Output setting: Two Output Mode (BUSY, ERROR, OUT1, and OUT2)
	    X: Fixed
	• Output setting: Four Output Mode (OUT1, OUT2, OUT3, and OUT4)
	    0: OFF
	    1: ON

▪ 1:N Protocol

Command

OUT1/OUT2 controls	0: Read 1: Turn ON 2: Turn OFF

OUT3/OUT4 controls	Output setting: Two Output Mode (BUSY, ERROR, OUT1, and OUT2)
	   Always "0".
	Output setting: Four Output Mode (OUT1, OUT2, OUT3, and OUT4)
	   0: Read
	   1: Turn ON
	   2: Turn OFF

Response

TRG1/2 Input status	The current input status 0: OFF 1: ON
OUT1/2 Output status	The output status of OUT1 and OUT2 after execution. 0: OFF 1: ON

OUT3/4 Output status	The output status of OUT3 and OUT4 after execution.
	• Output setting: Two Output Mode (BUSY, ERROR, OUT1, and OUT2)
	   X: Fixed
	• Output setting: Four Output Mode (OUT1, OUT2, OUT3, and OUT4)
	   0: OFF
	   1: ON

■ READ ERROR INFORMATION (CF)

The READ ERROR INFORMATION command is used to read error log information from the Controller.

▪ 1:1 Protocol

Command

Command code	Process desig-nation	Fixed value	Terminator	
C F	×	0	*	CR
2	1	1	2	

Process designation	Specifies the process to execute. "0": Read error information "1": Clear error information

Response

Resend flag

Command code	End code	Fixed value		New error log information	Terminator	
C F	× ×	0	0	× × ··· × ×	* CR	
2	2	1	1	n	2	

New error log information	Up to 30 records of error log information will be returned.
	Error log information is returned in chronological order with the newest records first. Each record is five characters long.
	
	RD 1 70 ;
	        └─Generated end code
	     └─ Head No. with error (for communications with Data Carriers only)
	      A space will be output for when the error is not a communications error.
	    └───Error command

Example

This example shows the response for when a format error occurred for a command and then a Tag communications error occurred for a READ command. Both errors occurred for Antenna 1.

Response

Fixed Resend
value flag

Command code	End code			New error log information	Terminator	
C F	× ×	0	0	R D 1 7 0 ; R D 1 4 ;	* CR	
2	2	1	1	n	2	

▪ 1:N Protocol

Command

SOH	Fixed value	Controller No.		Command code		Process designation	Fixed value		FCS		Terminator	
@	0	×	×	C	F	×	0	×	×	✱	CR	
1	1	2		2		1	1	2		2		

Process designation	Specifies the process to execute. "00": Read error information "01": Clear error information

Response

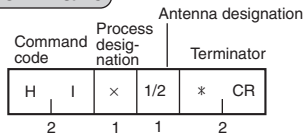| SOH	Fixed value	Controller No.		Command code		End code		Fixed value	Resend flag	New error log information					FCS		Terminator	
@	0	×	×	C	F	×	×	0	0	×	×	…	×	×	×	×	✱	CR
1	1	2		2		2		1	1			n			2		2	

New error log information	Up to 30 records of error log information will be returned. Error log information is returned in chronological order with the newest records first. Each record is five characters long.
	RD 1 70 ; └─ Generated end code └─ Head No. with error (for communications with Data Carriers only) A space will be output for when the error is not a communications error. └─ Error command

■ READ HISTORY INFORMATION (HI)

The READ HISTORY INFORMATION command is used to read the history information of Tag communications.

▪ 1:1 Protocol

Command

Command code	Process designation	Antenna designation	Terminator
H I	×	1/2	∗ CR
2	1	1	2

Process designation	Specifies the process to execute. "0": Read history information. "1": Clear history information.
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

CHECK! The error log information will not be cleared even if clearing the Controller history information is specified (process designation 1). Use the READ ERROR INFORMATION (CF) command to clear the error log information.

📖 p. 137

Response

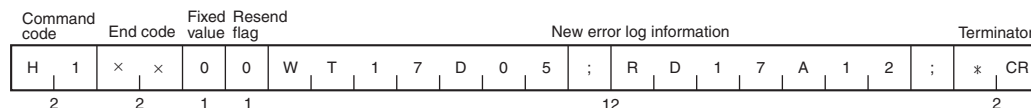| Command code	End code	Antenna designation	Resend flag	Controller history information	Terminator
H I	× ×	1/2	0	× × ... × ×	∗ CR
2	2	1	1	n	2

Controller history information	Up to 30 records of Controller history information will be returned. History information is returned in chronological order with the newest records first. Each record is five characters long. RD 1 70 12 ; └─ Noise level when error occurred 　　("00" to "99", "XX" when noise is not detected) └─ Generated end code └─ Head No. with error (for communications with Data Carriers only) 　　A space will be output for when the error is not a communications error. └─ Error command

Example

This example shows the response for when an address error occurred for a READ command and then a protection error occurred for a WRITE command. Both errors occurred for Antenna 1.

Response

Command code	End code	Fixed value	Resend flag	New error log information	Terminator
H I	× ×	0	0	W T 1 7 D 0 5 ; R D 1 7 A 1 2 ;	∗ CR
2	2	1	1	12	2

■ 1:N Protocol

Command

Process designation	Specifies the process to execute. "0": Read history information. "1": Clear history information.
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

CHECK!

The error log information will not be cleared even if clearing the Controller history information is specified (process designation 1). Use the READ ERROR INFORMATION (CF) command to clear the error log information.

Response

| Controller history information	Up to 30 records of Controller history information will be returned. History information is returned in chronological order with the newest records first. Each record is five characters long.
	RD 1 70 ; 　　　　　Generated end code 　　　Head No. with error (for communications with Data Carriers only) 　　　A space will be output for when the error is not a communications error. 　　Error command

Host Commands

■ TEST Command (TS)

The TEST command is used to test communications between the host device and ID Controller. The TEST command is used to send a text message from the host device to the ID Controller. The ID Controller returns the same text message unaltered.
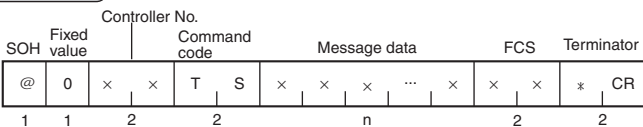
■ 1:1 Protocol
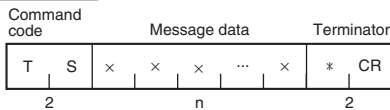
Command

Message data	Any text string to use to text communications. Number of characters: 262 max.

Response

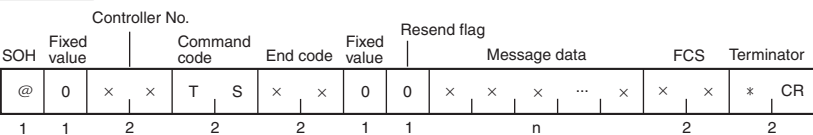## ▪ 1:N Protocol

Command

Message data	Any text string to use to text communications. Number of characters: 262 max.

Response

■ VERSION READ (VS)

The VERSION READ command is used to read the Controller's software model, software version, and software creation date.

▪ 1:1 Protocol

Command

Command code		Terminator	
V	S	∗	CR
2		2	

Response

Resend flag

Command code		End code		Fixed value	Resend flag	Software model	;	Software version	;	Creation date	Terminator	
V	S	0	0	0	0	Software model	;	Software version	;	Creation date	∗	CR
2		2		1	1	18	1	4	1	10	2	

Software model	The software model. V680-CA5D0*$000000
Software version	The software version. *.**
Software creation date	The software creation date. 20**/**/**

▪ 1:N Protocol

Command

Controller No.

SOH	Fixed value	Controller No.		Command code		FCS		Terminator	
@	0	×	×	V	S	×	×	∗	CR
1	1	2		2		2		2	

Response

SOH	Fixed value	Controller No.		Command code		End code	Fixed value	Resend flag	Software model	;	Software version	;	Creation date	FCS		Terminator	
@	0	×	×	V	S	0 0	0	0	Software model	;	Software version	;	Creation date	×	×	∗	CR
1	1	2		2		2	1	1	18	1	4	1	4	2		2	

Software model	The software model. V680-CA5D0*$000000
Software version	The software version. *.**
Software creation date	The software creation date. 20**/**/**

Evaluation Command

■ NOISE DETECTION (NS)

The NOISE DETECTION command is used to check the noise level when the command is received.

This Command cannot be used when the V680-H01 Antenna is connected.

CHECK!

▪ 1:1 Protocol

Command

```
              Antenna
              designation
Command Fixed         Terminator
code    value    |    |
 N  S    0   1/2    *   CR
 2      1    1         2
```

Fixed value	Always "0".
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

Response

```
                          Resend flag
              Antenna
              desig-   Average    Maximum    Minimum
Command       nation   noise level noise level noise level Terminator
code   End code  |   |   |    |     |    |     |    |     |
 N  S   ×   ×   1/2  0   ×    ×     ×    ×     ×    ×     *   CR
 2      2       1    1   2          2          2          2
```

Average noise level	Gives the average noise level that was measured. "00" to "99"
Maximum noise level	Gives the maximum noise level that was measured. "00" to "99"
Minimum noise level	Gives the minimum noise level that was measured. "00" to "99"

▪ 1:N Protocol

Command

Fixed value	Always "0".
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

Response

Average noise level	Gives the average noise level that was measured. "00" to "99"
Maximum noise level	Gives the maximum noise level that was measured. "00" to "99"
Minimum noise level	Gives the minimum noise level that was measured. "00" to "99"

Other Command Codes

◼ UNDEFINED COMMAND RESPONSE (IC)

If the ID Controller receives a command code that it cannot interpret, it will return a response for the undefined command.

▪ 1:1 Protocol

Response

▪ 1:N Protocol

Response

◼ Error Response

If an error occurs during communications with the host device or the Tag, error information is provided in the end code.

▪ 1:1 Protocol

Response

▪ 1:N Protocol

Response

List of End Codes

End codes are expressed in 2-digit hexadecimal.

Classification	End code	Name
Normal end	00	Normal end
		Command processing terminated.
		Polling command query (after communications with Tag were completed normally)
		Polling command cancelled.
		Normal end (no error) for DATA CHECK command or OVERWRITE COUNT CONTROL command
	01	Polling command received.
	02	Polling command query (no results information)
	03	Multi-access communications ended
Host communications error	10	Parity error
	11	Framing error
	12	Overrun error
	13	FCS error
	14	Format error
	15	Execution condition error
	18	Frame length error
Tag communications error	70	Tag communications error
	71	Mismatch error
	72	Tag missing error
	76	Error end (verification error or overwrite count exceeded) for DATA CHECK command, OVERWRITE COUNT CONTROL command or Data check error in READ TAG MEMORY ERROR CORRECTION command
	77	Data check warning in READ TAG MEMORY ERROR CORRECTION command
	79	Tag error
	7A	Address error
	7C	Antenna not connected error
	7D	Write protected error
System error	92	Antenna internal power supply voltage error
	93	Internal memory error
	9C	Number of Antennas error
		Former Antenna setting error

Refer to *Error Lists* for details on error checks.

CHECK! p. 224

V600 Commands

Read/Write Functions

■ Read/Write Command Processing

The normal (not auto) read/write functions are used for communications with Tags within a fixed area. Therefore, check that the Tag is within the Antenna's communications area before sending read/write commands. If a Tag is not present, a Tag missing error response will be returned.
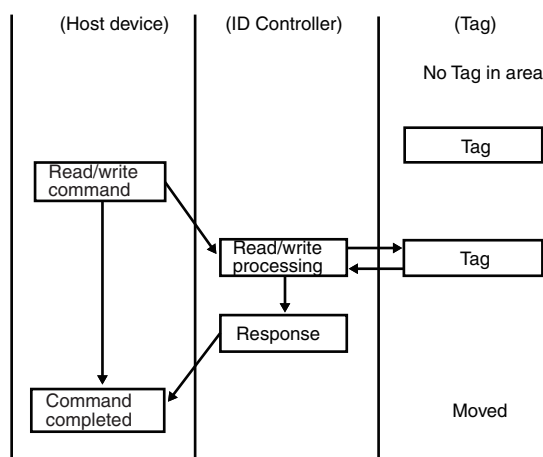

1. Confirm that the Tag is within the communications area before sending the command from the host device.

2. The ID Controller performs read or write processing according to the command.

3. After processing has been completed, the ID Controller returns a processing completed response to the host device. The host device receives the response and then moves the workpiece (with Tag) along the production line.

Auto Read/Write Functions

■ Auto Command Processing

The ID Controller does not return a response for AUTO commands until a Tag is within range. The communications path with the host device is busy during this time.
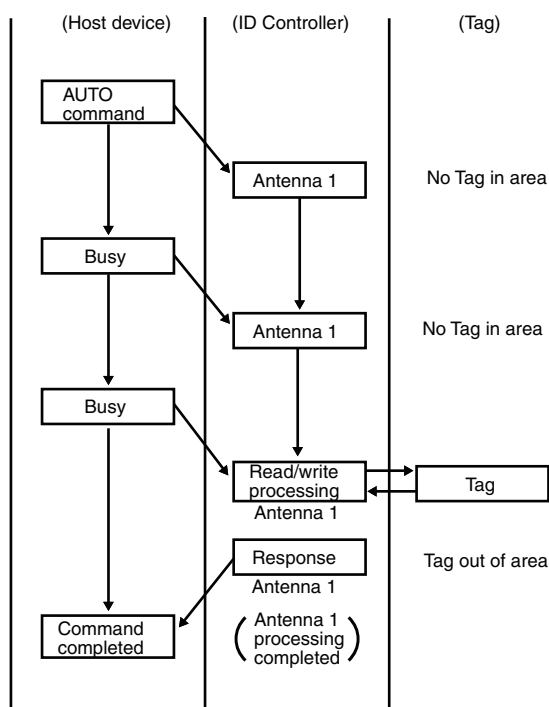

1. An AUTO command is sent for an Antenna from the host device.

2. The ID Controller does not return a response while the Tag is not in range, so the host device is in busy status.

3. Read or write processing is performed when the Tag passes in front of the Antenna.

4. After processing has been completed, the ID Controller sends a processing completed response for the AUTO command to the host device.

Using AUTO READ/AUTO WRITE Commands

Normally, read/write commands are used when a Tag is in the communications area. The AUTO READ and AUTO WRITE commands are used for moving Tags.

● READ or WRITE Command

Antenna

Tag
Stationary
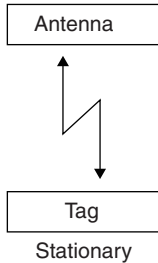
• Communications are more reliable because a greater communications distance is possible compared to a moving Tag.

● AUTO READ or AUTO WRITE Command

Antenna

Tag
Moving
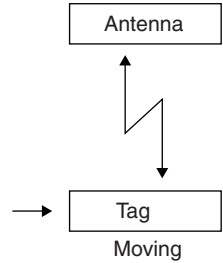
• If an AUTO command is used, approaching Tags can be detected automatically.
• If the Tag speed is slow and positioning is accurate, the communications distance is restricted only minimally.

● Command Application

Item	Application method	Description	Precautions
Sending commands using a timer	The next AUTO command is set when a response to the previous command is received. Tag Antenna	• A timer can be used effectively when Tags pass through the Antenna's communication area at a fixed cycle. • A timer can be used effectively when time is required until the next Tag arrives. • A timer can be used to prevent repeating the same communication with the same Tag by waiting for the Tag to leave the communications area after the communication has been completed.	• The Tag speed must be consistent. • Application is possible only when communicating more than once with the same Tag is not required.
Trigger	The next AUTO command is set when a trigger is received after receiving a response to the previous command. Tag Tag Antenna Trigger	• A trigger can be used effectively, for example, when it is necessary to confirm the completion of a previous process before sending the AUTO command. • The trigger must be received before the next Tag approaches.	• Trigger processing is required.

SECTION 5 V600 Commands

Polling Function

This section describes command processing when two Antennas are connected to one ID Controller. With normal AUTO commands, the ID Controller does not return a response while the Tag is not in range, i.e., the communications path with the host device is busy and the host device cannot send a command to the other Antenna connected to the same ID Controller.

With a POLLING AUTO command, however, the ID Controller returns a response only when a request is received from the host device. Therefore, the communications path does not continue to remain in busy status and the host device can send a command to the other Antenna connected to the same ID Controller.
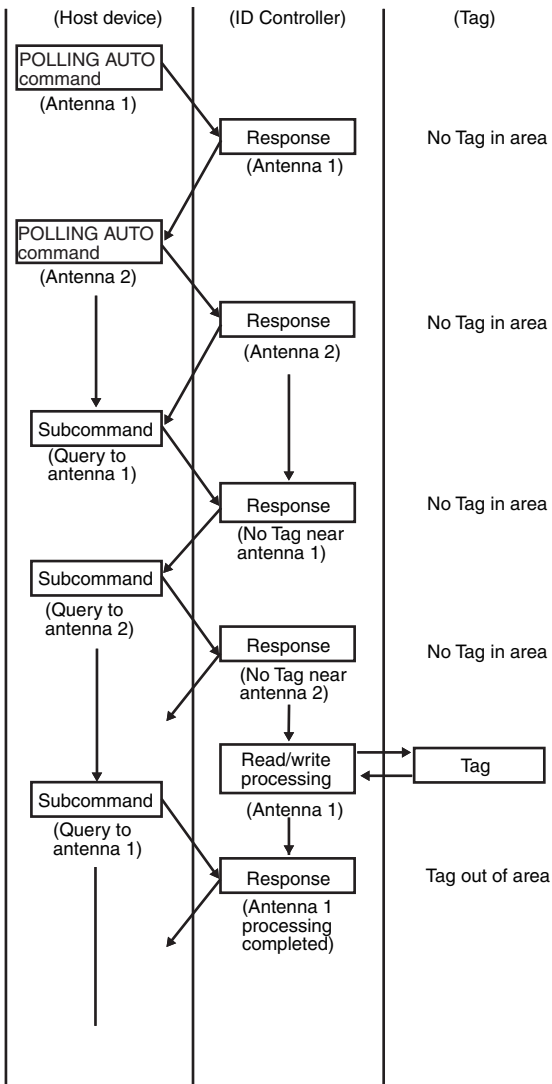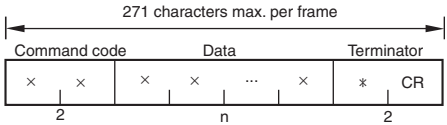

1. A POLLING AUTO command is sent to Antenna 1.
2. After receiving the command, the ID Controller immediately returns a response indicating that the command was received.
3. A POLLING AUTO command is sent to Antenna 2.
4. After receiving the command, the ID Controller immediately returns a response indicating that the command was received.
5. The host device can send subcommands to query processing status, or abort polling auto processing.

6. If the Tag is not in range, an out-of-range response will be returned for the query subcommand.

7. Read or write processing is performed when the Tag passes in front of the Read/Write Antenna.

8. After processing has been completed, the ID Controller returns a response with the processing results for Antenna 1 to the host device for the query subcommand.
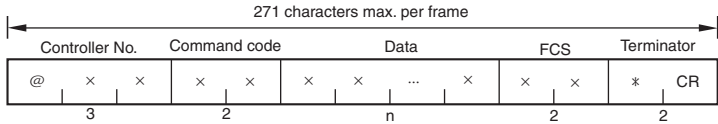
Command and Response Formats

■ 1:1 Protocol

```
            271 characters max. per frame

Command code         Data              Terminator

  ×    ×    ×    ×   ...   ×      *    CR

     2            n                   2
```

■ 1:N Protocol

```
                 271 characters max. per frame

Controller No.  Command code      Data         FCS    Terminator

 @    ×    ×    ×    ×    ×    ×   ...  ×    ×    ×    *    CR

      3            2            n           2         2
```

CHECK! The Controller No. is given as a decimal number between 00 and 31.

Name	Description
Controller No.	The Controller number (00 to 31) is included only for 1:N protocol. The Controller number must be preceded by the @ mark and is specified as a decimal value.
Command code	A 2-character code that specifies the command to be executed is added. The same command code is returned in the response.
Data	Command and response information is entered here. • ASCII/Hexadecimal designation, process designation, and mode designation • Destination Antenna designation • Start address • Write data or number of read bytes
FCS (See note.)	Horizontal parity check data that is added when using 1:N protocol.
Terminator	Indicates the end of the command or response.

Note: Refer to FCS Calculation Example for details on calculation programs for the FCS.

SECTION 5   V600 Commands

Command List

Commands can be classified into four major types.

■ Commands for Tag Communications

The following commands are used to communicate with Tags.

Command code	Name	Description	Page
RD	READ	Reads memory data from the Tag.	p. 162
WT	WRITE	Writes data to the memory of the Tag.	p. 164
XR	EXPANSION READ	Reads up to 2 Kbytes of data from the Tag by dividing the response into frames.	p. 166
XW	EXPANSION WRITE	Writes up to 2 Kbytes of data from the Tag by dividing the command into frames.	p. 170
ER	LARGE READ	Reads up to 8 Kbytes of data from a Tag.	p. 174
AR	AUTO READ	Reads data from Tag memory when the Tag approaches.	p. 178
AW	AUTO WRITE	Writes data to Tag memory when the Tag approaches.	p. 180
DF	DATA FILL	Writes the specified data to the specified number of bytes beginning from the specified start address.	p. 182
AF	AUTO DATA FILL	Writes the specified data to the specified number of bytes beginning from the specified start address when the Tag approaches.	p. 185
CP	COPY	Reads data from the memory of a Tag using one Antenna and writes it to the memory of the Tag in the other Antenna's communications area.	p. 187
AP	AUTO COPY	Waits for Tags to approach and then reads data from the memory of a Tag using one Antenna and writes it to the memory of the Tag in the other Antenna's communications area.	p. 189
PR	POLLING AUTO READ	Reads data from Tag memory when the Tag approaches. The processing results can be queried later using a subcommand.	p. 191
PW	POLLING AUTO WRITE	Writes data to Tag memory when the Tag approaches. The processing results can be queried later using a subcommand.	p. 195
MD C/K	DATA CHECK	Checks the memory check code in the Tag.	p. 199
MD S/L	OVERWRITE COUNT CONTROL	Used to manage the number of times data is written to a Tag.	p. 201
RP	WRITE REPEAT	Executes the most recently executed write command again.	p. 203

■ Communications Subcommands

The following commands are used to cancel command execution.

| Command code	Name	Description	Page
AA	COMMAND PRO-CESSING TERMI-NATE	Forcefully ends communications with a Tag.	p. 205
XZ	ABORT	Resets the ID Controller to the status entered immediately after turning ON the power supply. The ID Controller does not send a response. Do not use the ABORT command while the ID Controller is communicating with a Tag.	p. 206

■ Host Commands

The following commands are used to control the ID Controller.

Command code	Name	Description	Page
TS	TEST	Checks the communications conditions between the ID Controller and host device. The data sent by the host device is returned by the ID Controller without modification.	p. 207
CC	CONTROLLER CONTROL	Controls ID Controller I/O.	p. 208
CF	READ ERROR INFORMATION	Reads the error log.	p. 210
TR	COMMUNICA-TIONS SET	Sets serial communications parameters for communicating with the host device.	p. 212
SP	PARAMETER SET	Sets, reads, or initializes ID Controller parameters.	p. 214

FCS Calculation Example
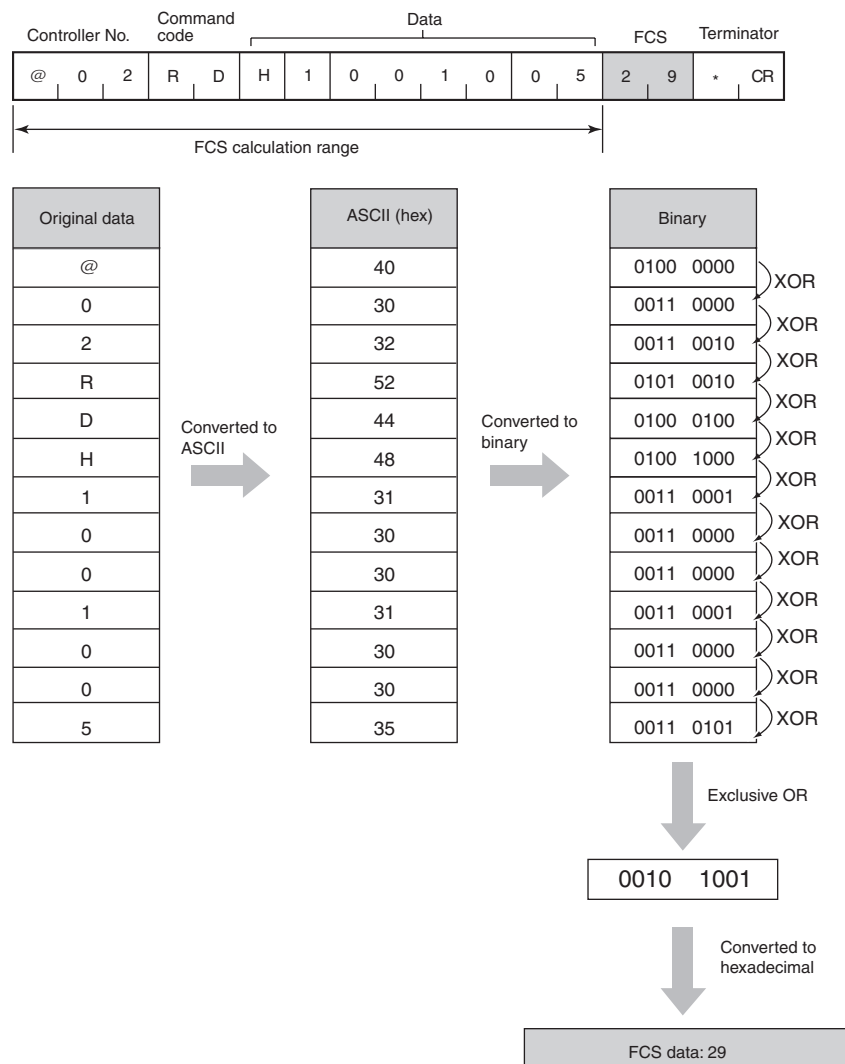
■ Reading 5 Bytes Started from Address 0010$_H$

Commands for Tag Communications

This section describes the commands that are used to communicate with Tags.

■ READ (RD)

The READ command reads data from a Tag. If there is no Tag in the communications area, the ID Controller will return an error response with an error code of 72 (Tag missing error).

▪ 1:1 Protocol

[Command]

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to read	Specifies the number of bytes of data to read from the Tag in 2-digit hexadecimal. Up to 256 bytes can be read with one command. Setting range: 00H to FF (Specify 00H for 256 bytes.) • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters)

[Response]

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

▪ 1:N Protocol

Command

Controller No.			Command code		Data desig-nation	Antenna designation	Read area start address				No. of bytes to read		FCS		Terminator	
@	×	×	R	D	A/H	1/2	×	×	×	×	×	×	×	×	∗	CR
3			2		1	1	4				2		2		2	

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000_H to $FFFF_H$
No. of bytes to read	Specifies the number of bytes of data to read from the Tag in 2-digit hexadecimal. Up to 256 bytes can be read with one command. • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters) Setting range: 00_H to FF_H (Specify 00H for 256 bytes.)

Response

Controller No.			Command code		End code		Read data					FCS		Terminator	
@	×	×	R	D	0	0	×	×	...	×	×	×	×	∗	CR
3			2		2		n					2		2	

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

■ WRITE (WT)

The WRITE command writes data to a Tag. If there is no Tag in the communications area, the ID Controller will return an error response with an error code of 72 (Tag missing error).

▪ 1:1 Protocol

Command

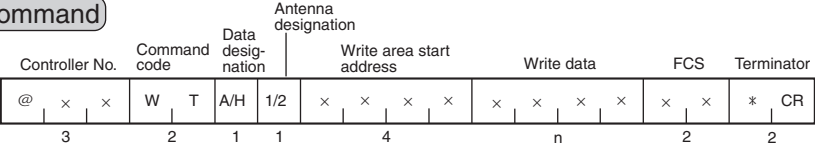| Data designation	Specifies the code format when sending the Tag write data. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000_H to $FFFF_H$
Write data	Specified the data to be written to the Tag. Up to 256 bytes can be written with one command. • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters) **Note:** When hexadecimal is designated, set two characters for each byte.

Response

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. ![book] p. 219

■ **1:N Protocol**

Command

Data designation	Specifies the code format when sending the Tag write data. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH
Write data	Specified the data to be written to the Tag. Up to 256 bytes can be written with one command. • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters) **Note:** When hexadecimal is designated, set two characters for each byte.

Response

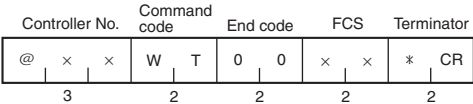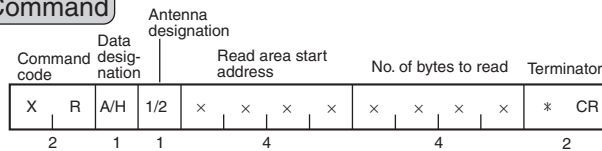| End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219

■ EXPANSION READ (XR)

The EXPANSION READ command reads up to 2 Kbytes of data from a Tag by dividing the response into frames. If there is no Tag in the communications area, the ID Controller will return an error response with an error code of 72 (Tag missing error).

The host device cannot send another command to the ID Controller until all response frames have been received.
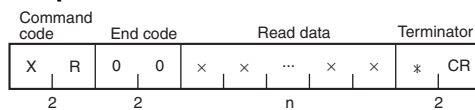
▪ 1:1 Protocol

Command

Command code	Data desig-nation	Antenna designation	Read area start address				No. of bytes to read				Terminator	
X	R	A/H	1/2	×	×	×	×	×	×	×	×	∗	CR
2	1	1		4				4				2

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal. Up to 2,048 bytes can be read with one command. Setting range: 0001$_H$ to 0800$_H$ • 1000 Byte Tags (V680-D1KP@@)　　　• 2000 Byte Tags (V680-D2KF@@) 　ASCII: 1000 bytes (1000 characters)　　　ASCII: 2000 bytes (2000 characters) 　Hexadecimal: 1000 bytes (2000 characters)　　Hexadecimal: 2000 bytes (4000 characters) • 8k/32k Byte Tags (V680-D8KF68/-D32KF68) 　ASCII: 2048 bytes (2048 characters) 　Hexadecimal: 2048 bytes (4096 characters)

Response

Responses with 256 or Fewer Characters

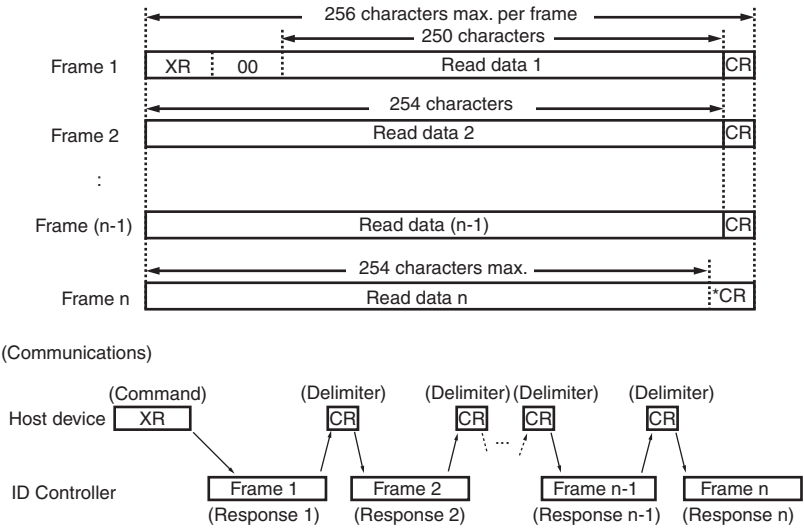| Command code	End code		Read data					Terminator	
X	R	0	0	×	×	···	×	×	∗	CR
2	2		n					2	

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 　📖 p. 219
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

Responses Longer Than 256 Characters

If the response containing the read data is longer than 256 characters, the response is divided into multiple frames as shown below. Only the final response frame ends in a terminator (*CR). All other frames end in a delimiter (CR).

When the ID Controller sends any response frame except for the last one, it will wait for the host device to return a delimiter (CR). When the ID Controller receives the delimiter, it will send the next response frame.

(Communications)

▪ 1:N Protocol

Command

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal. Up to 2,048 bytes can be read with one command. Setting range: 0001$_H$ to 0800$_H$ • 1000 Byte Tags (V680-D1KP@@) ASCII: 1000 bytes (1000 characters) Hexadecimal: 1000 bytes (2000 characters) • 8k/32k Byte Tags (V680-D8KF68/-D32KF68) ASCII: 2048 bytes (2048 characters) Hexadecimal: 2048 bytes (4096 characters) • 2000 Byte Tags (V680-D2KF@@) ASCII: 2000 bytes (2000 characters) Hexadecimal: 2000 bytes (4000 characters)

Response

Responses with 256 or Fewer Characters

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

Responses Longer Than 256 Characters

If the response containing the read data is longer than 256 characters, the response is divided into multiple frames as shown below. Only the final response frame ends in a terminator (*CR). All other frames end in a delimiter (CR). When the ID Controller sends any response frame except for the last one, it will wait for the host device to return a delimiter (CR). When the ID Controller receives the delimiter, it will send the next response frame.
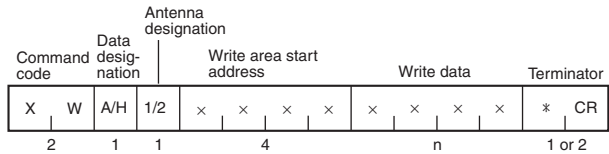
■ EXPANSION WRITE (XW)

The EXPANSION WRITE command writes up to 2 Kbytes of data to a Tag by dividing the command into frames. If there is no Tag in the communications area, the ID Controller will return an error response with an error code of 72 (Tag missing error).

The host device cannot send another command to the ID Controller until the response has been received.

▪ 1:1 Protocol

Command

First Frame

Data designation	Specifies the code format for sending the write data to the Tag. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area from which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH
Write data	Specified the data to be written to the Tag. Number of characters: 1 to 257
Terminator	Indicates the end of the frame. CR: Indicates there is another frame. *CR: Indicates there is not another frame.

All Other Frames

Write data	Specified the data to be written to the Tag. Number of characters: 0 to 265
Terminator	Indicates the end of the frame. CR: Indicates there is another frame. *CR: Indicates there is not another frame.

Response

Command
code | End code | Terminator

| X | W | 0 | 0 | * | CR |

2 | 2 | 2

End code	Indicates the execution result for the command.
	"00" indicates a normal end.
	Refer to List of End Codes for information on other end codes.
	p. 219

▪ Dividing Frames

If the command length is longer than 271 characters, divide the command into separate frames before sending the command.

When the ID Controller receives any frame except for the last frame, it will return a delimiter (CR) to the host device, indicating that the ID Controller is ready to accept the next command frame.

Method for Dividing Frames

1. Divide the command into frames with 271 or fewer characters each.
2. Attach the terminator (*CR) to the last frame (frame n) only. Attach the delimiter (CR) to the end of all other frames.
3. Be sure to include the command code, data designation, antenna designation, and start address in the first frame (frame 1). If any of these parameters is omitted, a command input error will occur. Write data does not have to be included in the first frame.
4. Make sure that data is divided correctly without any single frames containing only AA*CR or XZ*CR.

▪ 1:N Protocol
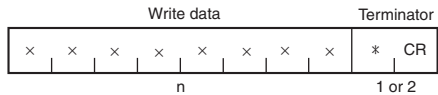
Command

First Frame

Data designation	Specifies the code format for sending the write data to the Tag. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area from which data is to be written in 4-digit Setting range: 0000_H to $FFFF_H$
Write data	Specified the data to be written to the Tag. Number of characters: 1 to 257
Terminator	Indicates the end of the frame. CR: Indicates there is another frame. *CR: Indicates there is not another frame.

All Other Frames

Write data	Specified the data to be written to the Tag. Number of characters: 0 to 265
Terminator	Indicates the end of the frame. CR: Indicates there is another frame. *CR: Indicates there is not another frame.

Response

Controller No.	Command code	End code	FCS	Terminator
@ × ×	X W	0 0	× ×	＊ CR
3	2	2	2	2

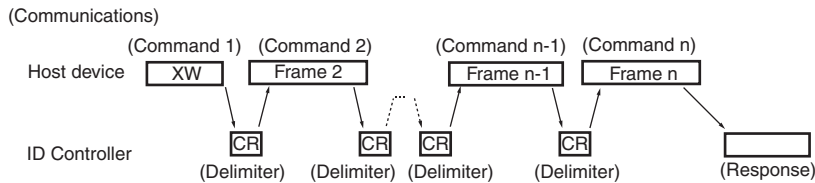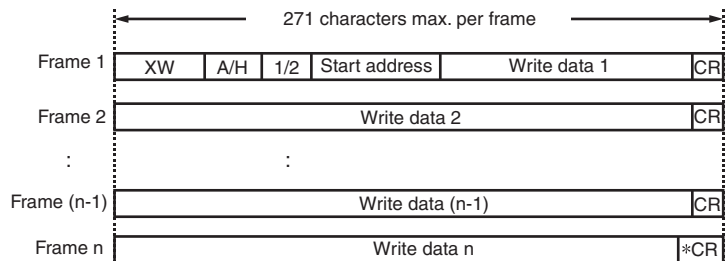| End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219

▪ Dividing Frames

If the command length is longer than 271 characters, divide the command into separate frames before sending the command

When the ID Controller receives any frame except for the last frame, it will return a delimiter (CR) to the host device, indicating that the ID Controller is ready to accept the next command frame.
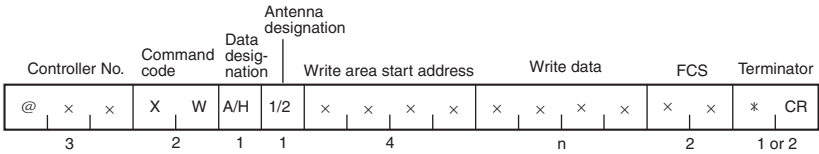
Method for Dividing Frames

1. Divide the command into frames with 271 or fewer characters each.
2. Attach the terminator (＊ CR) to the last frame (frame n) only. Attach the delimiter (CR) to the end of all other frames.
3. Be sure to include the command code, data designation, antenna designation, and start address in the first frame (frame 1). If any of these parameters is omitted, a command input error will occur. Write data does not have to be included in the first frame
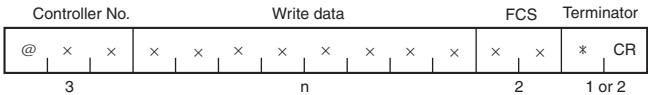4. Make sure that data is divided correctly without any single frames containing only AA＊CR or XZ＊CR.
5. Be sure to include the Controller number and FCS in all frames.

(Communications)

■ LARGE READ (ER)

The LARGE READ command reads up to 8 Kbytes of data from a Tag. If there is no Tag, the ID Controller returns an error response with an error code of 72 (Tag missing error).

▪ 1:1 Protocol

Command

Antenna designation

Command code	Data desig-nation		Read area start address				No. of bytes to read				Terminator	
E	R	A/H	1/2	×	×	×	×	×	×	×	×	＊	CR
2	1	1			4				4			2	

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH

No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal.
	Up to 8,192 bytes can be read with one command.
	Setting range: 0001H to 2000H
	
	• 1000 Byte Tags (V680-D1KP@@) • 2000 Byte Tags (V680-D2KF@@)
	  ASCII: 1000 bytes (1000 characters) ASCII: 2000 bytes (2000 characters)
	  Hexadecimal: 1000 bytes (2000 characters) Hexadecimal: 2000 bytes (4000 characters)
	• 8k/32k Byte Tags (V680-D8KF68/-D32KF68)
	  ASCII: 8192 bytes (8192 characters)
	  Hexadecimal: 8192 bytes (16384 characters)

Response

Responses of 245 Characters or Fewer

Command code		End code		Read data					Terminator	
E	R	0	0	×	×	…	×	×	＊	CR
2		2				n			2	
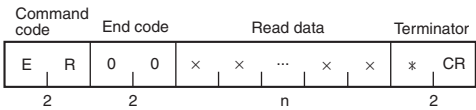
Responses Longer Than 245 Characters

If the response containing the read data is longer than 245 characters, the response is divided into multiple frames as shown below. Only the final response frame ends in a terminator (*CR). All other frames end in a delimiter (CR).

By default, each response frame is separated by 20 ms. The interval between frames can be changed using the PARAMETER SET (SP) command.

p. 214

| End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

▪ 1:N Protocol

Command

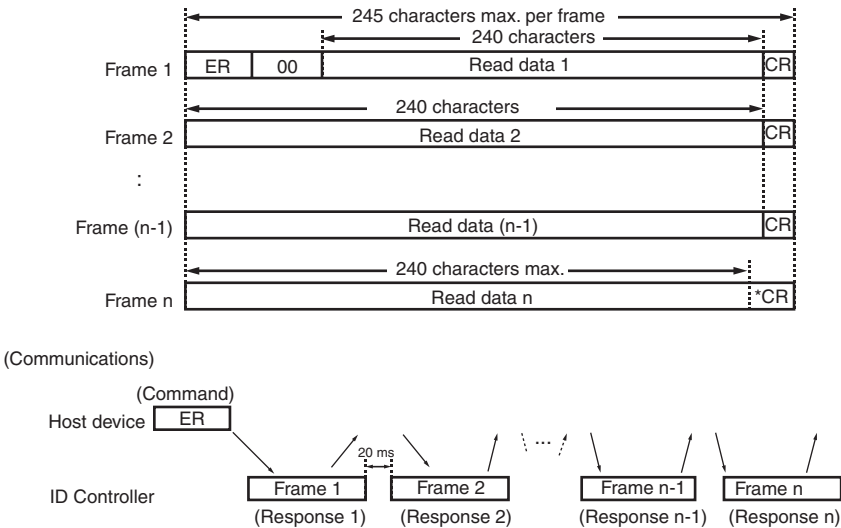| Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH

No. of bytes to read	Specifies the number of bytes to read from the Tag in 4-digit hexadecimal.
	 Up to 8,192 bytes can be read with one command.
	   Setting range: 0001H to 2000H
	
	 • 1000 Byte Tags (V680-D1KP@@) • 2000 Byte Tags (V680-D2KF@@)
	   ASCII: 1000 bytes (1000 characters) ASCII: 2000 bytes (2000 characters)
	   Hexadecimal: 1000 bytes (2000 characters) Hexadecimal: 2000 bytes (4000 characters)
	 • 8k/32k Byte Tags (V680-D8KF68/-D32KF68)
	   ASCII: 8192 bytes (8192 characters)
	   Hexadecimal: 8192 bytes (16384 characters)

Response

Responses of 250 Characters or Fewer

Responses Longer Than 250 Characters

If the response containing the read data is longer than 250 characters, the response is divided into multiple frames as shown below. Only the final response frame ends in a terminator (*CR). All other frames end in a delimiter (CR).

By default, each response frame is separated by 20 ms. The interval between frames can be changed using the PARAMETER SET (SP) command.

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

■ AUTO READ (AR)

The AUTO READ command Reads data from Tag memory when the Tag approaches. The ID Controller will return a response when communications with the Tag have been completed.

▪ 1:1 Protocol

(Command)

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to read	Specifies the number of bytes of data to read from the Tag in 2-digit hexadecimal. Up to 256 bytes can be read with one command. Setting range: 00H to FF (Specify 00H for 256 bytes.) • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters)

(Response)

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 📖 p. 219
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

▪ 1:N Protocol

Command

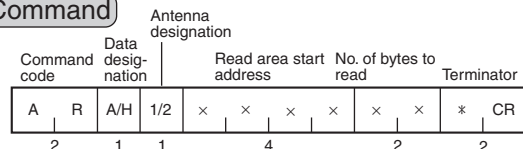| Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to read	Specifies the number of bytes of data to read from the Tag in 2-digit hexadecimal. Up to 256 bytes can be read with one command. Setting range: 00$_H$ to FF (Specify 00H for 256 bytes.) • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters)

Response

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219
Read data	The data read from the Tag. The number of characters will be the same as the specified number of bytes to read for ASCII data and twice that number for hexadecimal data.

■ AUTO WRITE (AW)

The AUTO WRITE command writes data to Tag memory when the Tag approaches. The ID Controller will return a response when communications with the Tag have been completed.
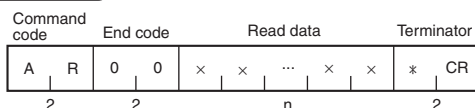
▪ 1:1 Protocol

Command

Data designation	Specifies the code format when sending the Tag write data. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH
Write data	Specified the data to be written to the Tag. Up to 256 bytes can be written with one command. • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters) **Note:** When hexadecimal is designated, set two characters for each byte.

Response

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 📖 p. 219

▪ 1:N Protocol

Command

Controller No.	Command code	Data desig-nation	Antenna designation	Write area start address	Write data	FCS	Terminator
@ × ×	A W	A/H	1/2	× × × ×	× × × ×	× ×	* CR
3	2	1	1	4	n	2	2

Data designation	Specifies the code format when sending the Tag write data. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH
Write data	Specified the data to be written to the Tag. Up to 256 bytes can be written with one command. • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters) **Note:** When hexadecimal is designated, set two characters for each byte.

Response

Controller No.	Command code	End code	FCS	Terminator
@ × ×	A W	0 0	× ×	* CR
3	2	2	2	2

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 📖 p. 219

■ DATA FILL (DF)

The DATA FILL command writes the specified data to the specified number of bytes beginning from the specified start address. If there is no Tag in the communications area, the ID Controller will return an error response with an error code of 72 (Tag missing error).

▪ 1:1 Protocol

Command

		Antenna designation											
Command code	Data desig- nation		Write area start address				No. of bytes to write		Designated data				Terminator
D F	A/H	1/2	×	×	×	×	×	×	×	×	×	×	* CR
2	1	1			4			2		2 or 4			2

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to write	Specifies the number of bytes of data to write to the Tag in 2-digit hexadecimal. Setting range: 01$_H$ to FF$_H$ (Specify 00H for 256 bytes.)
Designated data	Specified the data to be written to the Tag. • ASCII: 2 digits specified. • Hexadecimal: 4 digits specified.

Response

Command code	End code	Terminator	
D F	0 0	* CR	
2	2	2	

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 📖 p. 219

Example

In this example, 0101H is written to Tag memory for 0006H bytes starting from address 0030H. Each of the address originally contains the value of the address.

Command

	Command code	Data desig- nation	Antenna designation	Write area start address				No. of bytes to write		Designated data				Terminator	
	D	F	H	1/2	0	0	3	0	0	6	0	1	0	1	∗	CR
	2	1	1	4				2		4				2	

Response

	Command code		End code		Terminator	
	D	F	0	0	∗	CR
	2		2		2	

	Before Writing	
002FH	2	F
0030H	3	0
0031H	3	1
0032H	3	2
0033H	3	3
0034H	3	4
0035H	3	5
0036H	3	6

	After Writing	
002FH	2	F
0030H	0	1
0031H	0	1
0032H	0	1
0033H	0	1
0034H	0	1
0035H	0	1
0036H	3	6

SECTION 5 V600 Commands

▪ 1:N Protocol

Command

Command diagram showing: Controller No. | Command code | Data designation | Antenna designation | Write area start address | No. of bytes to write | Designated data | FCS | Terminator

| @ | × | × | D | F | A/H | 1/2 | × | × | × | × | × | × | × | × | × | × | × | × | * | CR |

with byte counts: 3, 2, 1, 1, 4, 2, 2 or 4, 2, 2

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to write	Specifies the number of bytes of data to write to the Tag in 4-digit hexadecimal. Setting range: 01H to FFH (Specify 00H for 256 bytes.)
Designated data	Specified the data to be written to the Tag. • ASCII: 2 digits specified. • Hexadecimal: 4 digits specified.

Response

Response diagram showing: Controller No. | Command code | End code | FCS | Terminator

| @ | × | × | D | F | 0 | 0 | × | × | * | CR |

with byte counts: 3, 2, 2, 2, 2

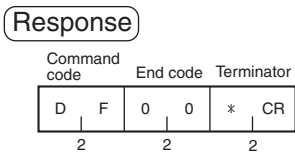| End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219

■ AUTO DATA FILL (AF)

The AUTO DATA FILL command writes the specified data to the specified number of bytes beginning from the specified start address when the Tag approaches. A response will be returned when communications with the Tag have been completed.

▪ 1:1 Protocol

Command

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to write	Specifies the number of bytes of data to write to the Tag in 2-digit hexadecimal. Setting range: 01H to FFH (Specify 00H for 256 bytes.)
Designated data	Specified the data to be written to the Tag. • ASCII: 2 digits specified. • Hexadecimal: 4 digits specified.

Response

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219

■ 1:N Protocol

Command

Controller No. | Command code | Data designation | Antenna designation | Write area start address | No. of bytes to write | Designated data | FCS | Terminator

| @ | × | × | A | F | A/H | 1/2 | × | × | × | × | × | × | × | × | × | × | × | × | ∗ | CR |
| 3 | | 2 | 1 | 1 | | 4 | | 2 | | 2 or 4 | | | 2 | | 2 | |

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to write	Specifies the number of bytes of data to write to the Tag in 2-digit hexadecimal. Setting range: 01$_H$ to FF$_H$ (Specify 00H for 256 bytes.)
Designated data	Specified the data to be written to the Tag. • ASCII: 2 digits specified. • Hexadecimal: 4 digits specified.

Response

Controller No. | Command code | End code | FCS | Terminator

| @ | × | × | A | F | 0 | 0 | × | × | ∗ | CR |
| 3 | | 2 | | 2 | | 2 | | 2 | | |

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219

■ Copy (CP)

The COPY command reads data from the memory of the Tag in one Antenna's communications area and writes it to the memory of the Tag in the other Antenna's communications area. If there is no Tag to copy data from, the ID Controller will return an error response with an error code of 72 (Tag missing error). If there is no Tag to write to, the ID Controller will return an error response with an error code of 76 (copy error).

This command cannot be used with the V680-CA5D01-V2.

▪ 1:1 Protocol

Command

Command code	Data desig- nation	Antenna designation	Read area start address				No. of bytes to copy				Destination start address				Terminator	
C	P	H	1/2	×	×	×	×	×	×	×	×	×	×	×	×	∗	CR
2	1	1	4				4				4				2	

Data designation	Always "H".
Antenna designation	Specifies the Antenna with which to communicate. "1": Reads from Antenna 1 and writes to Antenna 2. "2": Reads from Antenna 2 and writes to Antenna 1.
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to copy	Specifies the number of bytes of data to copy in 4-digit hexadecimal. Setting range: 0001H to 0800H
Destination start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH

Response

Command code		End code		Terminator	
C	P	0	0	∗	CR
2		2		2	

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 📖 p. 219

▪ 1:N Protocol

Command

Controller No. / Command code / Data desig-nation / Antenna designation / Read area start address / No. of bytes to copy / Destination start address / FCS / Terminator

@ × × | C P | H | 1/2 | × × × × | × × × × | × × × ×
3 | 2 | 1 | 1 | 4 | 4 | 4

× × | * CR
2 | 2

Data designation	Always "H".
Antenna designation	Specifies the Antenna with which to communicate. "1": Reads from Antenna 1 and writes to Antenna 2. "2": Reads from Antenna 2 and writes to Antenna 1.
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to copy	Specifies the number of bytes of data to copy in 4-digit hexadecimal. Setting range: 0001H to 0800H
Destination start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH

Response

Controller No. / Command code / End code / FCS / Terminator

@ × × | C P | 0 0 | × × | * CR
3 | 2 | 2 | 2 | 2

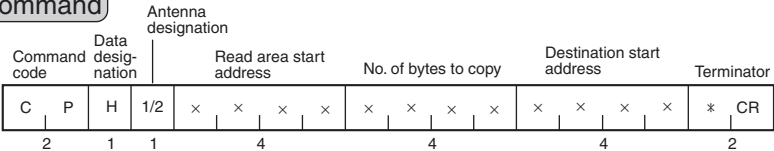| End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 　p. 219

■ AUTO COPY (AP)

When the ID Controller receives the AUTO COPY command, it waits for Tags to approach and then reads data from the memory of the Tag using one Antenna and writes it to the memory of the Tag in the other Antenna's communications area. An error response (end code 76: copy error) will be returned if there is no Tag at the copy destination.

This command cannot be used with the V680-CA5D01-V2.

▪ 1:1 Protocol

Command

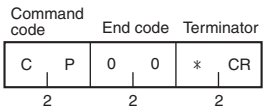| Command code	Data designation	Antenna designation	Read area start address	No. of bytes to copy	Destination start address	Terminator
A P	H	1/2	× × × ×	× × × ×	× × × ×	∗ CR
2	1	1	4	4	4	2

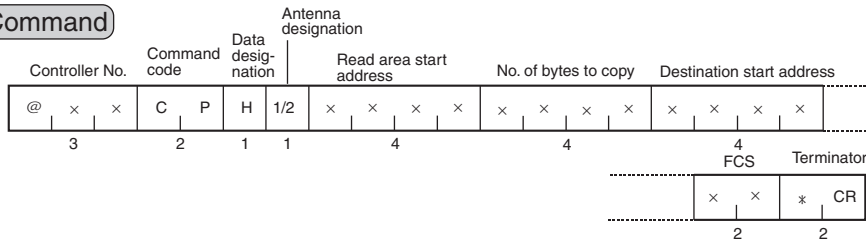| Data designation	Always "H".
Antenna designation	Specifies the Antenna with which to communicate. "1": Reads from Antenna 1 and writes to Antenna 2. "2": Reads from Antenna 2 and writes to Antenna 1.
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to copy	Specifies the number of bytes of data to copy in 4-digit hexadecimal. Setting range: 0001$_H$ to 0800$_H$
Destination start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$

Response

Command code	End code	Terminator
A P	0 0	∗ CR
2	2	2

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 📖 p. 219

SECTION 5   V600 Commands

▪ 1:N Protocol

Command

Data designation	Always "H".
Antenna designation	Specifies the Antenna with which to communicate. "1": Reads from Antenna 1 and writes to Antenna 2. "2": Reads from Antenna 2 and writes to Antenna 1.
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to copy	Specifies the number of bytes of data to copy in 4-digit hexadecimal. Setting range: 0001$_H$ to 0800$_H$
Destination start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$

Response

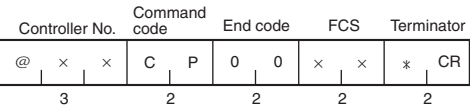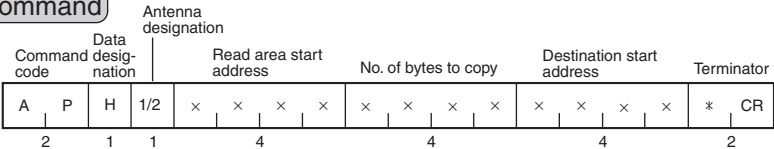| End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219

■ POLLING AUTO READ (PR)

When the ID Controller receives a POLLING AUTO READ command from the host device, it immedi-ately sends a response acknowledging that the command was received. Data is then read when a Tag approaches. During this interval, subcommand can be used to check on the command processing results. Command can also be sent to the other Antenna during this interval.

▪ 1:1 Protocol

Command

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000H to FFFFH
No. of bytes to read	Specifies the number of bytes of data to read from the Tag in 2-digit hexadecimal. Up to 256 bytes can be read with one command. Setting range: 00H to FF (Specify 00H for 256 bytes.) • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters)

Response

End code	Indicates the execution result for the command. "74": Polling command received The only error codes that may be returned here are 74 and communications errors with the host device. Refer to List of End Codes for information on other end codes. p. 219

Subcommand

```
                          Query/cancel designation
                          Antenna designation
   Command                       Terminator
   code
   ┌───┬───┬───┬───┬───┐
   │ P │ R │C/E│1/2│ ✳ │ CR │
   └───┴───┴───┴───┴───┘
     2     1   1       2
```

Query/cancel designation	Specifies querying or canceling polling auto processing. "C": Processing results query "E": Processing results cancel
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

Subcommand Response

```
   Command
   code     End code     Read data        Terminator
   ┌───┬───┬───┬───┬───┬───┬───┬───┬───┬───┐
   │ P │ R │ 0 │ 0 │ × │ × │...│ × │ × │ ✳ │ CR │
   └───┴───┴───┴───┴───┴───┴───┴───┴───┴───┘
     2       2           n             2
```

End code	Indicates the execution result for the command. "00": Normal end "74": No Tag has approached when polling auto processing results were requested. "75": No Tag has approached when polling auto processing was cancelled. "76": Communications processing was in progress or completed when polling auto processing was cancelled. Refer to List of End Codes for information on other end codes. p. 219
Read data	The data that was read according to the command that was executed.

■ 1:N Protocol

Command

Antenna designation

Controller No.	Command code	Data desig-nation		Read area start address	No. of bytes to read	FCS	Terminator
@ ✕ ✕	P R	A/H	1/2	✕ ✕ ✕ ✕	✕ ✕	✕ ✕	＊ CR
3	2	1	1	4	2	2	2

Data designation	Specifies the code format when sending the read data response. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Read area start address	Specifies the start address of the area in the Tag from which data is to be read from in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
No. of bytes to read	Specifies the number of bytes of data to read from the Tag in 2-digit hexadecimal. Up to 256 bytes can be read with one command. Setting range: 00$_H$ to FF$_H$ (Specify 00H for 256 bytes.) • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters)

Response

Controller No.	Command code	End code	FCS	Terminator
@ ✕ ✕	P R	7 4	✕ ✕	＊ CR
3	2	2	2	2

End code	Indicates the execution result for the command. "74": Polling command received Refer to List of End Codes for information on other end codes. 📖 p. 219

Subcommand

Query/cancel designation	Specifies querying or canceling polling auto processing. "C": Processing results query "E": Processing results cancel
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

Subcommand Response

End code	Indicates the execution result for the command. "00": Normal end "74": No Tag has approached when polling auto processing results were requested. "75": No Tag has approached when polling auto processing was cancelled. "76": Communications processing was in progress or completed when polling auto processing was cancelled. Refer to List of End Codes for information on other end codes. 📖 p. 219
Read data	The data that was read according to the command that was executed.

■ POLLING AUTO WRITE (PW)

When the ID Controller receives a POLLING AUTO WRITE command from the host device, it immediately sends a response acknowledging that the command was received. Data is then written when a Tag approaches. During this interval, subcommand can be used to check on the command processing results. Command can also be sent to the other Antenna during this interval.
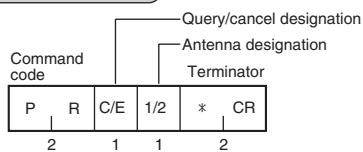
▪ 1:1 Protocol

Command

Command code	Data designation	Antenna designation	Write area start address				Write data				Terminator	
P	W	A/H	1/2	×	×	×	×	×	×	×	×	*	CR
2	1	1		4				n				2	

Data designation	Specifies the code format when sending the Tag write data. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFF$_H$
Write data	Specified the data to be written to the Tag. Up to 256 bytes can be written with one command. • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters) **Note:** When hexadecimal is designated, set two characters for each byte.

Response

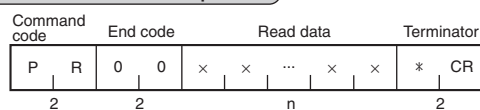| Command code		End code		Terminator	
P	W	7	4	*	CR
2		2		2	

End code	Indicates the execution result for the command. "74": Polling command received The only error codes that may be returned here are 74 and communications errors with the host device. Refer to List of End Codes for information on other end codes.

Subcommand

Command
code
Query/cancel designation
Antenna designation
Terminator

P	W	C/E	1/2	∗	CR
2		1	1		2

Query/cancel designation	Specifies querying or canceling polling auto processing. "C": Processing results query "E": Processing results cancel
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

Subcommand Response

Command
code   End code   Terminator

P	W	0	0	∗	CR
2		2		2	

End code	Indicates the execution result for the command. "00": Normal end "74": No Tag has approached when polling auto processing results were requested. "75": No Tag has approached when polling auto processing was cancelled. "76": Communications processing was in progress or completed when polling auto processing was cancelled. Refer to List of End Codes for information on other end codes. p. 219

▪ 1:N Protocol

Command

Data designation	Specifies the code format when sending the Tag write data. "A": ASCII "H": Hexadecimal
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Write area start address	Specifies the start address of the area in the Tag to which data is to be written in 4-digit hexadecimal. Setting range: 0000H to FFFFH
Write data	Specified the data to be written to the Tag. Up to 256 bytes can be written with one command. • ASCII: 256 bytes (256 characters) • Hexadecimal: 256 bytes (512 characters) **Note:** When hexadecimal is designated, set two characters for each byte.

Response

End code	Indicates the execution result for the command. "74": Polling command received The only error codes that may be returned here are 74 and communications errors with the host device. Refer to List of End Codes for information on other end codes. p. 219

Subcommand

Query/cancel designation

Antenna designation

Controller No.			Command code		Query/cancel designation	Antenna designation	FCS		Terminator	
@	×	×	P	W	C/E	1/2	×	×	∗	CR
3			2		1	1	2		2	

Query/cancel designation	Specifies querying or canceling polling auto processing. "C": Processing results query "E": Processing results cancel
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2

Subcommand Response

Controller No.			Command code		End code		FCS		Terminator	
@	×	×	P	W	0	0	×	×	∗	CR
3			2		2		2		2	

End code	Indicates the execution result for the command. "00": Normal end "74": No Tag has approached when polling auto processing results were requested. "75": No Tag has approached when polling auto processing was cancelled. "76": Communications processing was in progress or completed when polling auto processing was cancelled. Refer to List of End Codes for information on other end codes. p. 219

■ DATA CHECK (MD C/K)

The DATA CHECK command is used to write or verify the CRC code in the specified check block. The CRC code is generated using the following polynomial $X^{16} + X^{12} + X^5 + 1$.

▪ 1:1 Protocol

Command

Command code	Process desig-nation	Antenna designation	Check block start address				No. of check block bytes		Terminator	
M	D	C/K	1/2	×	×	×	×	×	×	*	CR
2		1	1		4			2		2	

Process designation	Specifies the check process. "C": Check code verification "K": Check code calculation
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Check block start address	Specifies the start address of the check block in 4-digit hexadecimal. Setting range: 0000H to FFFDH
No. of check block bytes	Specifies the number of bytes in the check block in 2-digit hexadecimal. Setting range: 00H, 03H to FFH (Specify 00H for 256 bytes.) Specify the number of bytes in the check code calculation area plus two for the number of check block bytes. Refer to *Tag Memory Error Correction* for details. 📖 p. 80

Response

Command code		End code		Terminator	
M	D	×	×	*	CR
2		2		2	

End code	Indicates the execution result for the command. 00: Normal end 75: Data normal (only when verification is performed) 76: Data error warning (only when verification is performed) Refer to List of End Codes for information on other end codes. 📖 p. 219

Refer to *Tag Memory Error Correction* for details on memory checks.

CHECK! 📖 p. 80

- **1:N Protocol**

Command

Controller No. / Command code / Process designation / Antenna designation / Check block start address / No. of check block bytes / FCS / Terminator

| @ | × | × | M | D | C/K | 1/2 | × | × | × | × | × | × | × | × | * | CR |

3   2   1   1   4   2   2   2

Process designation	Specifies the check process. "C": Check code verification "K": Check code calculation
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Check block start address	Specifies the start address of the check block in 4-digit hexadecimal. Setting range: 0000H to FFFDH
No. of check block bytes	Specifies the number of bytes in the check block in 2-digit hexadecimal. Setting range: 00H, 03H to FFH (Specify 00H for 256 bytes.) Specify the number of bytes in the check code calculation area plus two for the number of check block bytes. Refer to *Tag Memory Error Correction* Function for details. 📖 p. 80

Response

Controller No. / Command code / End code / FCS / Terminator

| @ | × | × | M | D | × | × | × | × | * | CR |

3   2   2   2   2

End code	Indicates the execution result for the command. 00: Normal end 75: Data normal (only when verification is performed) 76: Data error warning (only when verification is performed) Refer to List of End Codes for information on other end codes. 📖 p. 219

CHECK!   Refer to *Tag Memory Error Correction* for details on memory checks.

📖 p. 80

■ OVERWRITE COUNT CONTROL (MD S/L)

The OVERWRITE COUNT CONTROL command is used to manage overwrite counts for EEPROM Tags.

The specified overwrite count control area data is updated to enable determining when the EEPROM's write life has expired.

▪ 1:1 Protocol

Command

Mode designation	Specifies the check process. "S": Subtraction (Overwrite control count can be set by user.) (16,700,000 writes max.) (See note.) "L": Addition (Overwrite control count fixed at 100,000 writes.)
Antenna designation	Specifies the Antenna with which to communicate. "1": Antenna 1 "2": Antenna 2
Area start address	Specifies the start address of the overwrite count control area in 4-digit hexadecimal. Setting range: 0000$_H$ to FFFD$_H$
Decrement count	Specifies the number of refresh operations in 2-digit hexadecimal. Setting range: 00$_H$ to FF$_H$ (00H: Performs overwrite count check only)) Refer to *Tag Service Life Check* for details. ⬛ p. 77

Note: The write life for EEPROM Tags is 300,000 writes at 40°C.

Response

End code	Indicates the execution result for the command. 75: Normal end 76: Data error warning Refer to List of End Codes for information on other end codes. ⬛ p. 219

▪ 1:N Protocol

Command

Controller No. | Command code | Mode designation | Antenna designation | Area start address | Decrement count | FCS | Terminator

| @ | × | × | M | D | S/L | 1/2 | × | × | × | × | × | × | × | × | * | CR |

3 ... 2 ... 1 ... 1 ... 4 ... 2 ... 2 ... 2

Mode designation	Specifies the check process.
	"S": Subtraction (Overwrite control count can be set by user.) (16,700,000 writes max.) (See note.)
	"L": Addition (Overwrite control count fixed at 100,000 writes.)
Antenna designation	Specifies the Antenna with which to communicate.
	"1": Antenna 1
	"2": Antenna 2
Area start address	Specifies the start address of the overwrite count control area in 4-digit hexadecimal.
	Setting range: 0000H to FFFDH
Decrement count	Specifies the number of refresh operations in 2-digit hexadecimal.
	Setting range: 00H to FF (00H: Performs overwrite count check only)
	Refer to *Tag Service Life Check* for details.
	📖 p. 77

Note: The write life for EEPROM Tags is 300,000 writes at 40°C.

Response

Controller No. | Command code | End code | FCS | Terminator

| @ | × | × | M | D | 7 | 5 | × | × | * | CR |

3 ... 2 ... 2 ... 2 ... 2

End code	Indicates the execution result for the command.
	75: Normal end
	76: Data error warning
	Refer to List of End Codes for information on other end codes.
	📖 p. 219

■ WRITE REPEAT (RP)

The WRITE REPEAT command is used to execute the most recently executed write command again.

▪ 1:1 Protocol

Command

Command code | Terminator

| R | P | * | CR |

2   2

Response

Command code   End code   Terminator

| × | × | 0 | 0 | * | CR |

2   2   2

Command code	The command code is the same as the last write command that was executed.
End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 📖 p. 219

> Write command information is cleared at the following time.
> • When the ID Controller's power supply is reset.
>
> CHECK!
> If a WRITE REPEAT command is executed after write command information has been cleared, a command input error will occur.

■ 1:N Protocol

Command

Controller No. | Command code | FCS | Terminator

| @ | × | × | R | P | × | × | * | CR |
| 3 | | 2 | | 2 | | 2 | | |

Response

Controller No. | Command code | End code | FCS | Terminator

| @ | × | × | × | × | 0 | 0 | × | × | * | CR |
| 3 | | 2 | | 2 | | 2 | | 2 | | |

Command code	The command code is the same as the last write command that was executed.
End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219

Write command information is cleared at the following time.

• When the ID Controller's power supply is reset.

CHECK! If a WRITE REPEAT command is executed after write command information has been cleared, a command input error will occur.

Communications Subcommands

Communications subcommands are used in combination with commands for Tag communications. They cannot be used by themselves to communicate with a Tag.

■ COMMAND PROCESSING TERMINATE (AA)

The COMMAND PROCESSING TERMINATE command cancels any command except for polling commands and returns the ID Control to command standby status. This command can also be used to cancel communications for expansion commands with divided frames before completion of the expansion command.

▪ 1:1 Protocol

Command

Response

End code	Indicates the execution result for the command.
	14: No automatic or normal commands being processed.
	75: Processing terminated before a Tag was detected.
	76: Processing terminated while reading from or writing to a Tag.
	Refer to List of End Codes for information on other end codes.
	p. 219

▪ 1:N Protocol

Command

Response

End code	Indicates the execution result for the command.
	14: No automatic or normal commands being processed.
	75: Processing terminated before a Tag was detected.
	76: Processing terminated while reading from or writing to a Tag.
	Refer to List of End Codes for information on other end codes.
	p. 219

SECTION 5　V600 Commands

■ ABORT (XZ)

The ABORT command can be used to reset the ID Controller to command standby status during communications with the host device or a Tag if any sort of trouble occurs, e.g., if the ID Controller does not return a response. The ID Controller does not return a response to the ABORT command.

▪ 1:1 Protocol

Command

Command code		Terminator	
X	Z	∗	CR
2		2	

> About 100 ms is required after the ID Controller receives the ABORT command before it can receive the next command.
>
> CHECK!

▪ 1:N Protocol

Command

Controller No.			Command code		FCS		Terminator	
@	×	×	X	Z	×	×	∗	CR
3			2		2		2	

> About 100 ms is required after the ID Controller receives the ABORT command before it can receive the next command.
>
> CHECK!

Host Commands

■ TEST (TS)

The TEST command is used to test communications between the host device and ID Controller. The TEST command is used to send a text message from the host device to the ID Controller. The ID Controller returns the same text message unaltered.

▪ 1:1 Protocol

Command

```
Command
code        Message data      Terminator
 T   S  | ×  ×  ×  ···  × |  *   CR
   2           n              2
```

Message data	Any text string to use to text communications.
	Number of characters: 262 max.

Response

```
Command
code        Message data      Terminator
 T   S  | ×  ×  ×  ···  × |  *   CR
   2           n              2
```

▪ 1:N Protocol

Command

```
            Command
Controller No. code    Message data      FCS   Terminator
 @   ×   ×  | T  S | ×  ×  ×  ···  × | ×  × |  *   CR
     3        2           n            2      2
```

Message data	Any text string to use to text communications.
	Number of characters: 262 max.

Response

```
            Command
Controller No. code    Message data      FCS   Terminator
 @   ×   ×  | T  S | ×  ×  ×  ···  × | ×  × |  *   CR
     3        2           n            2      2
```

SECTION 5   V600 Commands

■ CONTROLLER CONTROL (CC)

The CONTROLLER CONTROL command is used to manipulate or read I/O.

▪ 1:1 Protocol

Command

Command code | Process code | OUT1 control | OUT2 control | Terminator

| C | C | 0 | 0 | × | × | ∗ | CR |
| 2 | | 2 | | 1 | 1 | 2 | |

Process code	Always "00".
OUT1/OUT2 controls	0: No operation 1: Turn ON 2: Turn OFF

Response

Command code | End code | Input status | Output status | Terminator

| C | C | 0 | 0 | × | × | × | × | ∗ | CR |
| 2 | | 2 | | 2 | | 2 | | 2 | |

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 📖 p. 219
Input status	The current input status (1st character: TRG1, 2nd character: TRG2) 0: OFF 1: ON
Output status	The output status after processing (1st character: OUT1, 2nd character: OUT2) 0: OFF 1: ON

▪ 1:N Protocol

Command

Controller No. | Command code | Process code | OUT1 control | OUT2 control | FCS | Terminator

| @ | × | × | C | C | 0 | 0 | × | × | × | × | ＊ | CR |

3 — 2 — 2 — 1 — 1 — 2 — 2

Process code	Always "00".
OUT1/OUT2 controls	0: No operation 1: Turn ON 2: Turn OFF

Response

Controller No. | Command code | End code | Input status | Output status | FCS | Terminator

| @ | × | × | C | C | 0 | 0 | × | × | × | × | × | × | ＊ | CR |

3 — 2 — 2 — 2 — 2 — 2 — 2

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219
Input status	The current input status (1st character: TRG1, 2nd character: TRG2) 0: OFF 1: ON
Output status	The output status after processing (1st character: OUT1, 2nd character: OUT2) 0: OFF 1: ON

■ READ ERROR INFORMATION (CF)

The READ ERROR INFORMATION command is used to read the most recent error log information stored in the Controller.

▪ 1:1 Protocol

Command

Process code	Specifies the process to execute.
	"00": Read error information
	"01": Clear error information

Response

End code	Indicates the execution result for the command.
	"00" indicates a normal end.
	Refer to List of End Codes for information on other end codes.
	p. 219
New error log information	Up to 30 records of error log information will be returned.
	Error log information is returned in chronological order with the newest records first. Each record is five characters long.

RD 1 70
— Generated error code
— Head No. with error (for communications with Data Carriers only)
  A space will be output for when the error is not a communications error.
— Error command

▪ 1:N Protocol

Command

Process code	Specifies the process to execute. "00": Read error information "01": Clear error information

Response

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. 📖 p. 219

New error log information	Up to 30 records of error log information will be returned.
	Error log information is returned in chronological order with the newest records first. Each record is five characters long.
	
	RD 1 70
	    └─Generated error code
	   └─ Head No. with error (for communications with Data Carriers only)
	    A space will be output for when the error is not a communications error.
	 └─────Error command

■ COMMUNICATIONS SET (TR)

The COMMUNICATIONS SET command is used to set serial communications parameters. To use the ID Controller with the new parameters, either restart the ID Controller or execute the ABORT command (XZ).

> This command is valid only when internal settings are enabled (i.e., when pin 1 on SW3 is ON).
>
> CHECK!

▪ 1:1 Protocol

Command

Command code | Baud rate designation | Data length designation | Parity | Stop bit length | Terminator

| T | R | × | × | × | × | ∗ | CR |
| 2 | | 1 | 1 | 1 | 1 | | 2 |

Baud rate designation	Specify the baud rate. "3": 9,600 bps "4": 19,200 bps "5": 38,400 bps "6": 115,200 bps Default setting: 9,600 bps
Data length designation	Specify the data length. "7": 7 bits "8": 8 bits Default setting: 7 bit
Parity	Specify the type of parity. "0": No parity "1": Odd parity "2": Even parity Default setting: Even parity
Stop bit length	Specify the number of stop bits. "1": 1 bit "2": 2 bits Default setting: 2 bits

Response

Command code | End code | Terminator

| T | R | 0 | 0 | ∗ | CR |
| 2 | | 2 | | 2 | |

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219

▪ 1:N Protocol

Command

Baud rate designation	Specify the baud rate. "3": 9,600 bps "4": 19,200 bps "5": 38,400 bps "6": 115,200 bps Default setting: 9,600 bps
Data length designation	Specify the data length. "7": 7 bits "8": 8 bits Default setting: 7 bits
Parity	Specify the type of parity. "0": No parity "1": Odd parity "2": Even parity Default setting: Even parity
Stop bit length	Specify the number of stop bits. "1": 1 bit "2": 2 bits Default setting: 2 bits

Response

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219

■ PARAMETER SET (SP)

The PARAMETER SET command is used to set conditions for communicating with Tags. The various parameters are set in the ID Controller.

> **CHECK!** The ID Controller does not need to be reset when internal settings are changed. The new settings are effective immediately.

> **CHECK!** A memory error will occur if the power supply is interrupted while parameters are being changed.

▪ 1:1 Protocol

Command

Process code (Upper digit)	Specifies the process to perform for the parameter. "0": Change internal setting. "1": Read internal setting. "9": Return initial setting to default value.	
Process code (Lower digit)	Specifies the parameter. "1": Controller No. (See note.) "2": Write verification enable (See note.) "3": Reception sensitivity "4": Auto command cancel time "6": Response delay time "7": No. of retries for Tag communications "8": Inter-character monitoring time "9": Tag communications procedure (See note.) "B": Lower trigger enable/disable (See note.) "C": Error output time "D": Number of test bytes setting "E": Noise monitor function setting "G": Noise detection count setting "H": Write protection setting	**Note:** Parameters 1, 2, 9, B, and H are valid only when internal settings are enabled (i.e., when pin 1 on SW3 is ON).

Parameter data (when there are changes)	Data No. (See note.)	Settable values
	"1"	Specify 2 decimal digits. "00" to "31" (unit number) Default value: "00"
	"2"	"0": Without verification "1": With verification (default value)
	"3"	"0": Low "1": Standard (default value)
	"4"	Specify 2 decimal digits. "00" to "99" (s) "00": No monitoring, Default value: "00" (s)
	"6"	Specify 2 decimal digits. "00" to "99" (ms) "00": No delay, Default value: "20" (ms)
	"7"	Specify 2 decimal digits. "00" to "99" (times) "00": No retries, Default value: "09" (times)
	"8"	Specify 4 decimal digits. "0000" to "9999" (ms) "0000": No monitoring, Default value: "0099" (ms)
	"9"	"0": 1:1 protocol (default value) "1": 1:N protocol
	"B"	"0": Disabled (default value) "1": Enabled
Parameter data (when there are changes)	"C"	Specify 4 decimal digits. "0000" to "9999" (ms) "0000": Infinite, Default value: "0500" (ms)
	"D"	Specify 4 hexadecimal digits. "0001" to "0800" (bytes) Default value: "0001" (bytes)
	"E"	"0": Noise monitor function OFF (default value) "1": Noise monitor function ON
	"G"	Specify 4 decimal digits. "0001" to "0100" (times) Default value: "0010" (times)
	"H"	"0": Write protection OFF (default value) "1": Write protection ON

Note: The data number of the parameter data is the number specified for the lower digit of the process code.
The settable values for the data number are the same as for the parameter specified by the lower digit of the process code.

Response

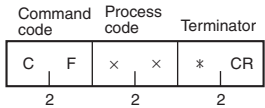| Command code	End code	Parameter data	Terminator
S P	0 0	× × × ×	* CR
2	2	1 to 4	2

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219
Parameter data	Attached only when parameter data is being obtained.

▪ 1:N Protocol

Command

Controller No. / Command code / Process code / Parameter data (when there are changes) / FCS / Terminator

@ ✕ ✕ S P ✕(Upper digit) ✕(Lower digit) ✕ ✕ ✕ ✕ ✕ ✕ ✱ CR
3 — 2 — 2 — 0 to 4 — 2 — 2

Process code (Upper digit)	Specifies the process to perform for the parameter. "0": Change internal setting. "1": Read internal setting. "9": Return initial setting to default value.	
Process code (Lower digit)	Specifies the parameter. "1": Controller No. (See note.) "2": Write verification enable (See note.) "3": Reception sensitivity "4": Auto command cancel time "6": Response delay time "7": No. of retries for Tag communications "8": Inter-character monitoring time "9": Tag communications procedure (See note.) "B": Lower trigger enable/disable (See note.) "C": Error output time "D": Number of test bytes setting "E": Noise monitor function setting "G": Noise detection count setting "H": Write protection setting	**Note:** Parameters 1, 2, 9, B, and H are valid only when internal settings are enabled (i.e., when pin 1 on SW3 is ON).
Parameter data (when there are changes)	Data No. (See note.)	Settable values
	"1"	Specify 2 decimal digits. "00" to "31" (unit number) Default value: "00"
	"2"	"0": Without verification "1": With verification (default value)
	"3"	"0": Low "1": Standard (default value)
	"4"	Specify 2 decimal digits. "00" to "99" (s) "00": No monitoring, Default value: "00" (s)
	"6"	Specify 2 decimal digits. "00" to "99" (ms) "00": No delay, Default value: "20" (ms)
	"7"	Specify 2 decimal digits. "00" to "99" (times) "00": No retries, Default value: "09" (times)
	"8"	Specify 4 decimal digits. "0000" to "9999" (ms) "0000": No monitoring, Default value: "0099" (ms)
	"9"	"0": 1:1 protocol (default value) "1": 1:N protocol
	"B"	"0": Disabled (default value) "1": Enabled
	"C"	Specify 4 decimal digits. "0000" to "9999" (ms) "0000": Infinite, Default value: "0500" (ms)
	"D"	Specify 4 hexadecimal digits. "0001" to "0800" (bytes) Default value: "0001" (bytes)
	"E"	"0": Noise monitor function OFF (default value) "1": Noise monitor function ON
	"G"	Specify 4 decimal digits. "0001" to "0100" (times) Default value: "0010" (times)
	"H"	"0": Write protection OFF (default value) "1": Write protection ON

Note: The data number of the parameter data is the number specified for the lower digit of the process code.
The settable values for the data number are the same as for the parameter specified by the lower digit of the process code.

Response

Controller No.	Command code	End code	Parameter data	FCS	Terminator
@ × ×	S P	0 0	× × × ×	× ×	∗ CR
3	2	2	1 to 4	2	2

End code	Indicates the execution result for the command. "00" indicates a normal end. Refer to List of End Codes for information on other end codes. p. 219
Parameter data	Attached only when parameter data is being obtained.

Other Command Codes

■ UNDEFINED COMMAND RESPONSE (IC)

If the ID Controller receives a command code that is not in the list of commands, it will return a response for the undefined command to the host device.

▪ 1:1 Protocol

Response

Command code		Terminator	
I	C	∗	CR
2		2	

▪ 1:N Protocol

Response

Controller No.			Command code		FCS		Terminator	
@	×	×	I	C	×	×	∗	CR
3			2		2		2	

■ Error Response

If an error occurs during communications with the host device or the Tag, error information is provided in the end code.

▪ 1:1 Protocol

Response

Command code		End code		Terminator	
×	×	×	×	*	CR
2		2		2	

▪ 1:N Protocol

Response

Controller No.			Command code		End code		FCS		Terminator	
@	×	×	×	×	×	×	×	×	∗	CR
3			2		2		2		2	
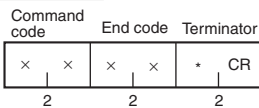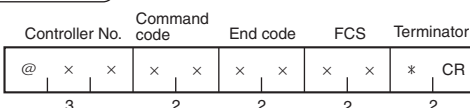
List of End Codes

End codes are expressed in 2-digit hexadecimal.

Classification	End code	Name
Normal end	00	Normal end
	74	Polling command received or polling command query (no results information).
	75	Auto command cancelled. (Processing cancelled before a Tag was detected.)
		Polling command cancelled. (Processing cancelled before a Tag was detected.)
	76	Auto command cancelled. (Processing cancelled after a Tag was detected.)
		Polling command cancelled. (Processing cancelled after a Tag was detected.)
Host communications error	10	Parity error
	11	Framing error
	12	Overrun error
	13	FCS error
	14	Format error
		Execution condition error
	18	Frame length error
Tag communications error	70	Tag communications error
	71	Mismatch error
	72	Tag missing error
	76	Copy error
	7A	Address error
	7C	Antenna not connected error
	7D	Write protected error
Tag memory warning	75	Normal end for DATA CHECK command or OVERWRITE COUNT CONTROL command (no error)
	76	Error end (verification error or overwrite count exceeded) for DATA CHECK command or OVERWRITE COUNT CONTROL command
System error	92	Antenna internal power supply voltage error
	93	Internal memory error

Refer to *Error Lists* for details on error codes

SECTION 6
Troubleshooting

Self-diagnostic Function

Details of Errors

■ Fatal Errors

If a CPU error or internal memory error occurs, the RUN/RST indicator will go out and RUN outputs will turn OFF. For internal memory errors, the COMM indicator will light red.
For Antenna supply voltage errors, the RUN/RST indicator will light green. RUN outputs will not turn OFF.

■ Nonfatal Errors

If an error occurs in communications between the ID Controller and host device or between the Antenna and a Tag, an error code will be displayed on the monitor display (error code display mode). Details of up to 30 errors can be stored in memory and can be read with a command from the host device.

Display and Output Status during Operation

■ Two Output Mode

Status		Indicator				Monitor	Output terminal				
		RUN/RST	COMM	COMM1 COMM2	NORM1/ERR1 NORM2/ERR2		RUN	BUSY	ERROR	OUT1	OUT2
Test	Processing communications	○ green	●	○ yellow	●	—	ON	OFF	OFF	—	—
	Communications processing interval	○ green	●	●	●	—	ON	OFF	OFF	—	—
	Communications normal	○ green	●	●	○ green	End code	ON	OFF	OFF	—	—
	Communications error	○ green	●	●	● red	Error code	ON	OFF	OFF	—	—
RUN	Waiting for data send/receive	○ green	●	●	●	—	ON	OFF	—	—	—
	Sending/receiving data	○ green	○ green	○ yellow	●	—	ON	ON	OFF	OFF	OFF
	Communications normal	○ green	●	●	○ green	End code	ON	OFF	OFF	USR	USR
	Host communications error	○ green	● red	●	●	Error code	ON	OFF	ON	OFF	OFF
	Communications error	○ green	●	●	● red	Error code	ON	OFF	ON	OFF	OFF
Fatal error	CPU error	●	●	●	●	—	OFF	OFF	OFF	OFF	OFF
	Antenna power supply error	○ green	●	●	●	92	ON	OFF	OFF	OFF	OFF
	Internal memory error	●	● red	●	●	93	OFF	OFF	OFF	OFF	OFF
Emergency stop	External reset input ON	● red	●	●	●	—	OFF	OFF	OFF	OFF	OFF

● : Not lit   ○ : Lit green   ○ : Lit yellow   ● : Lit red
USR: Set with a CONTROLLER CONTROL command.

■ Four Output Mode

Status		Indicator				Monitor	Output terminal				
		RUN/RST	COMM	COMM1 COMM2	NORM1/ERR1 NORM2/ERR2		RUN	OUT1	OUT2	OUT3	OUT4
Test	Processing communications	◌	●	◓	●	—	ON	—	—	—	—
	Communications processing interval	◌	●	●	●	—	ON	—	—	—	—
	Communications normal	◌	●	●	◌	End code	ON	—	—	—	—
	Communications error	◌	●	●	◑	Error code	ON	—	—	—	—
RUN	Waiting for data send/receive	◌	●	●	●	—	ON	—	—	—	—
	Sending/receiving data	◌	◌	◓	●	—	ON	OFF	OFF	OFF	OFF
	Communications normal	◌	●	●	◌	End code	ON	USR	USR	USR	USR
	Host communications error	◌	◑	●	●	Error code	ON	OFF	OFF	OFF	OFF
	Communications error	◌	●	●	◑	Error code	ON	OFF	OFF	OFF	OFF
Fatal error	CPU error	●	●	●	●	—	OFF	OFF	OFF	OFF	OFF
	Antenna power supply error	◌	●	●	●	92	ON	OFF	OFF	OFF	OFF
	Internal memory error	●	◑	●	●	93	OFF	OFF	OFF	OFF	OFF
Emergency stop	External reset input ON	◑	●	●	●	—	OFF	OFF	OFF	OFF	OFF

● : Not lit   ◌ : Lit green   ◓ : Lit yellow   ◑ : Lit red
USR: Set with a CONTROLLER CONTROL command.

Error Lists

V680 Commands

■ Communications Errors

Type	Error code	Name	Details
Host communications error	10	Parity error	Communications error between host device and ID Controller • Incorrect communications format settings • Malfunction due to noise
	11	Framing error	
	12	Overrun error	
	13	FCS error	Incorrect calculation of FCS
	14	Command input error	Incorrect command format
	15	Execution status error	• A communications command was received by an Antenna executing a polling command. • A COPY (CP) command was received by an Antenna processing polling. • A WRITE REPEAT (RP) command was received but there is no write command in memory. • A COMMAND PROCESS TERMINATE (AA) command was received but there is no command to terminate. • A POLLING QUERY (PC) command was received although no polling processing has been started. • A SELF EXECUTION START (MO) command was received but no operation conditions have been set. • A PARAMETER SET (SP) command was received when executing a Tag communications command. • OPERATION CONDITION SET (SE) commands were executed in the wrong order.
	18	Frame length error	The number of characters per command frame exceeds the specified value.
Tag communications error	70	Communications error	There is an error in communications between Antennas and Tags. • Installation problem, e.g., travel speed through communications area or distance • Malfunction due to an obstruction.
	71	Mismatch error	Write has not been processed correctly.
	72	Tag missing error	No Tag in communications area when read/write was executed.
	7A	Address designation error	An address outside the Tag memory area has been designated. The area start address has not been correctly designated when using the MDS/MDL command.
	7C	Amplifier error	• Cannot communicate due to Amplifier error. • Amplifier not connected. • An Antenna other than the one specified by the V680-H01 Antenna connection setting is connected.
	7D	Write protection error	A write-protected area was specified for a write command.

• Host communications errors are those that occur during communications between the host device and ID Controller.

• Tag communications errors are those that occur during communications between the ID Controller, Antennas, and Tags.

• The error details are all logged in the ID Controller memory and the error codes are displayed on the monitor display. Error data can be read using the READ ERROR INFORMATION (CF) command.

Note 1. If a Tag communications error (error code 70) or mismatch error (error code 71) occurs when a write command is executed, some or all of the data in the target addresses may have been overwritten. Overwritten data is not limited to data in the WRITE command. If an error (error code 70 or 71) occurs when a write command is executed, keep retrying the command from the host device until an error no longer occurs. Data at other addresses (i.e., not at the write addresses) is not affected.

2. An Amplifier error (error code 7C) will occur if an Amplifier is not connected to the ID Controller when using an Antenna with a Separate Amplifier. A Tag missing error (error code 72) will occur if the Antenna is not connected to the Amplifier.

3. If the Tag moves out of the communications area while a write command is being executed, all of the Tag data may not be written and a Tag communications error (error code 70) will occur.

Warning code	Name	Details
76	Tag overwrite count exceeded	Overwrite count exceeded warning for the OVER-WRITE COUNT CONTROL (MDS/MDL) command
	Tag memory check error	Memory error detection warning for the DATA CHECK (MDC) command
	Data check error in READ TAG MEMORY ERROR CORRECTION command	The check code of the READ TAG MEMORY ERROR CORRECTION (QR) command is incorrect, and bit correction is not possible.
77	Data check warning in READ TAG MEMORY ERROR CORRECTION command	There is an error in the data read with the READ TAG MEMORY ERROR CORRECTION (QR) command, 1-bit error correction was performed, and the data check ended normally. The returned read data can be used as it is.

• This warning data is not stored in the ID Controller memory.

■ System Errors

Error code	Name	Details
92	Antenna internal power supply voltage error	There is an error in the power supply voltage supplied from the ID Controller to the Antennas. • Have a spare ID Controller on hand.
93	Internal memory error	Possible ID Controller error or noise error • Cycle the power. • Turn ON reset input. • Set the communications conditions again with the SP command. (Have a spare ID Controller on hand in case the ID Controller does not recover normally.)
9C	Antenna connection error: Power consumption too high V680-H01 connection setting error	Too many Antennas are connected or the specified power consumption has been exceeded. An Antenna other than the one specified by the V680-H01 Antenna connection setting is connected.

V600 Commands

■ Communications Errors

Type	Error code	Name	Details
Host communications error	10	Parity error	Communications error between host device and ID Controller • Incorrect communications format settings • Malfunction due to noise
	11	Framing error	
	12	Overrun error	
	13	FCS error	Incorrect calculation of FCS
	14	Command input error	Incorrect command format
	18	Frame length error	The number of characters per command frame exceeds the specified value.
Tag communications error	70	Communications error	There is an error in communications between Antennas and Tags. • Installation problem, e.g., travel speed through communications area or distance • Malfunction due to an obstruction.
	71	Mismatch error	Write has not been processed correctly.
	72	Tag missing error	No Tag in communications area when read/write was executed.
	76	Copy error	Copy has not been processed correctly.
	7A	Address designation error	An address outside the Tag memory area has been designated. The area start address has not been correctly designated when using the MDS/MDL command.
	7C	Antenna error	Antenna has not been connected.
	7D	Write protection error	A write-protected area was specified for a write command.

- Host communications errors are those that occur during communications between the host device and ID Controller.
- Tag communications errors are those that occur during communications between the ID Controller, Antennas, and Tags.
- The error details are all logged in the ID Controller memory and the error codes are displayed on the monitor display. Error data can be read using the READ ERROR INFORMATION (CF) command.

Note 1. If a Tag communications error (error code 70), mismatch error (error code 71), or copy error (error code 76) occurs when a write command is executed, some or all of the data in the target addresses may have been overwritten. Overwritten data is not limited to data in the WRITE command. If an error (error code 70 or 71) or copy error (error code 76) occurs when a write command is executed, keep retrying the command from the host device until an error no longer occurs. Data at other addresses (i.e., not at the write addresses) is not affected.

2. An Amplifier error (error code 7C) will occur if an Amplifier is not connected to the ID Controller when using an Antenna with a Separate Amplifier. A Tag missing error (error code 72) will occur if the Antenna is not connected to the Amplifier.

3. If the Tag moves out of the communications area while a write command is being executed, all of the Tag data may not be written and a Tag communications error (error code 70) will occur.

Warning code	Name	Details
76	Tag overwrite count exceeded	Overwrite count exceeded warning for the OVER-WRITE COUNT CONTROL (MDS/MDL) command
	Tag memory check error	Memory error detection warning for the DATA CHECK (MDC) command

• This warning data is not stored in the ID Controller memory.

■ **System Errors**

Error code	Name	Details
92	Antenna internal power supply voltage error	The power supply voltage supplied from the ID Controller to the Antennas has dropped. • Have a spare ID Controller on hand.
93	Internal memory error	Possible ID Controller error or noise error • Cycle the power. • Turn ON reset input. • Set the communications conditions again with the SP command. (Have a spare ID Controller on hand in case the ID Controller does not recover normally.)

Errors and Countermeasures

The four main causes of problems that may occur in the V680 Series are as follows:

- Noise interference···························Take adequate countermeasures against noise.
- External device failure
- ID Controller failure   }············Repairs are required.
- Others

■ Noise Interference

If the system malfunctions due to noise, refer to the following table and take appropriate countermeasures.

No.	Occurrence of fault	Possible cause	Countermeasure
1	Occurs when a heavy-duty motor, transformer, or capacitor is turned ON.	An instantaneous voltage drop due to inrush current to the heavy load.	Increase the capacity of the power supply and the size of the power cable.
		Common mode noise as a result of the above cause.	• Provide the power through a 1-to-1 non-grounded insulating transformer. • Do not use the same ground as other large-capacity devices. Independently ground the Controller at a resistance of 100 Ω or less. (See figure 1.)
2	Occurs irregularly.	Noise on power line	Provide the power through a 1-to-1 non-grounded insulating transformer or noise filter. (See figure 2.)
3	Malfunction such as input signal turning ON when it should be OFF.	Inductive noise on input line	• Separate input signal from power lines. • If there is a lot of noise interference, put the input line inside a grounded metal conduit or use shielded cable.

Figure 1:
Improvement in Grounding
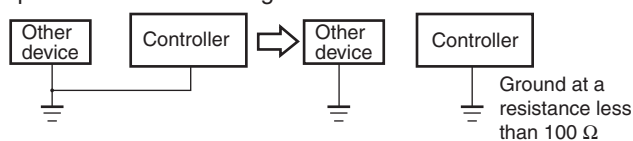
Figure 2:
Countermeasures Against Noise on Power Line
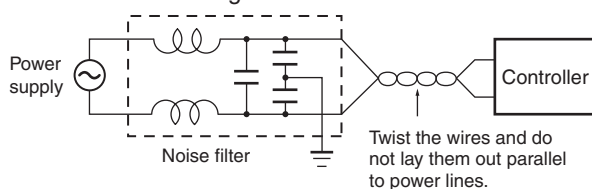
Maintenance and Inspection

The V680 Series must be inspected on a daily or regular basis so that the functions of the V680 Series can be used in good condition.

The V680 Series consists of semiconductors that last almost indefinitely. The following malfunctions may, however, result due to the operating environment and conditions.

1. Element deterioration due to overvoltage or overcurrent.

2. Element deterioration due to continuous stress caused by high ambient temperature.

3. Connector contact faults or insulation deterioration due to humidity and dust.

4. Connector contact faults or element corrosion due to corrosive gas.

■ **Inspection Items**

No.	Item	Detail	Criteria	Required equipment
1	Supply voltage fluctuation	Check that the supply voltage fluctuation at the power supply terminal block is within the permissible range.	Within supply voltage specified range	Multimeter
		Check that there are no frequent instantaneous power failures or radical voltage fluctuations.	Within permissible voltage fluctuation range	Power supply analyzer
2	Ambient environment 1) Temperature 2) Humidity 3) Vibration and shock 4) Dust 5) Corrosive gas	1)Within the specified range 2)Within the specified range 3)Influence of vibration or impact of machines 4)Check that the system is free of accumulated dust and foreign particles. 5)Check that no metal part of the system is discolored or corroded.	1) −10 to 55°C 2) 25% to 85% 3) Within the specified range 4) Neither is permitted. 5) Neither is permitted.	Maximum and minimum thermometer Hygrometer
3	Panel condition 1)Ventilation 2)Damage to packing for any enclosed construction	1)Check that the system is ventilated properly with natural ventilation, forced ventilation, or cooling air. 2)Check that the panel packing is properly attached with no damage.	1)The interior temperature must be within a range between −10 and 55°C with proper ventilation. 2)The packing must have no damage.	-
4	I/O power supply 1) Voltage fluctuation 2) Ripple	Check on the I/O terminal block that the voltage fluctuation and ripple are within the permissible ranges.	Within the specified range	Multimeter Oscilloscope
5	Mounting condition	Check that each device is securely mounted.	No loose screws	-
		Check that each connector is fully inserted.	Each connector must be locked or securely tightened with screws.	-
		Check that no screw of the terminal block is loose.	No loose screws	-
		Check that no wire is broken or nearly broken.	Must be no wire that is broken or nearly broken.	-
		Check that the distance between the Tag and Antenna is within the specified range.	Within the specified range	-
6	Tag life	Check the number of times the Tag has been written	Number of overwrites must not be exceeded	-
7	Error logging	Check error details	-	-

Troubleshooting

If an error results, fully check the whole situation, determine the relationship between the system and any other device, and refer to the following flowcharts for troubleshooting procedures.

Main Check Flowchart

System Connections Check Flowchart

```
                    ┌─────────────┐
                    │    Start    │
                    └─────────────┘
                           │
                           ▼
                    ╱─────────────╲
                   ╱   Are the     ╲        NO
                  ╱ connector and   ╲──────────────────┐
                  ╲ cable           ╱                   │
                   ╲ connections   ╱                    │
                    ╲   OK?       ╱                      │
                     ╲─────────╱                        │
                        │ YES                           │
                        ▼                               ▼
              ┌──────────────────┐            ┌──────────────────────┐
              │ Turn ON the power.│            │ Connect them correctly.│
              └──────────────────┘            └──────────────────────┘
                        │
                        ▼
              ╱─────────────────╲   Not lit    ╱─────────────────╲    YES
             ╱  RUN/RST indicator ╲───────────╱  Is the rated     ╲──────────┐
             ╲                    ╱            ╲  voltage supplied? ╱          │
              ╲─────────────────╱              ╲─────────────────╱           │
                     │ Lit                            │ NO                   │
                     │                                ▼                      │
                     │                      ┌──────────────────────┐         │
                     │                      │ Supply the rated voltage.│      │
                     │                      └──────────────────────┘         │
                     ▼                                              Lit red   ▼
              ╱─────────────────╲  Lit red               ┌─────────╱─────────────────╲
             ╱  RUN/RST indicator ╲──────────────┐       │         ╲  COMM indicator   ╱
             ╲                    ╱               │       │          ╲─────────────────╱
              ╲─────────────────╱                │       │                  │ Not lit
                     │ Lit green                 ▼       ▼
                     │                    ╱─────────────────╲
                     │                   ╱  Is the RESET     ╲   NO
                     │                   ╲  input ON?        ╱──────────────┐
                     │                    ╲─────────────────╱               │
                     │                           │ YES                      │
                     │                           ▼                          │
                     │                  ┌──────────────────┐                │
                     │                  │ Turn OFF the RESET│                │
                     │                  │ input.           │                │
                     │                  └──────────────────┘                │
                     ▼                                                      ▼
              ┌─────────────┐                              ┌──────────────────────┐
              │     OK      │                              │ Replace the Controller.│
              └─────────────┘                              └──────────────────────┘
```

Turn ON the RESET input. Turn ON the power again. Set the communications conditions again with the SP command.

Operating Conditions and External Environment Check Flowchart

```
                    ┌─────────────────┐
                    │     START        │
                    └─────────────────┘
                             │
                             ▼
                    ╱─────────────╲
                   ╱  Are the       ╲       NO      ┌──────────────────────────┐
                  ╱  operating        ╲───────────▶ │ Refer to Maintenance and  │
                   ╲ conditions OK?   ╱             │ Inspection.         p. 229 │
                    ╲───────────────╱               └──────────────────────────┘
                           │ YES
                           ▼
                    ╱─────────────╲
                   ╱  Is the ambient ╲      NO       ┌──────────────────────────┐
                  ╱   noise OK?        ╲───────────▶ │ Refer to Errors and        │
                   ╲                  ╱              │ Countermeasures.    p. 228 │
                    ╲───────────────╱               └──────────────────────────┘
                           │ YES
                           ▼
                    ┌─────────────────┐
                    │       OK         │
                    └─────────────────┘
```

Host Communications Check Flowchart

START

Is there a response?

NO → Is the connector wiring OK?

YES → Are the communications conditions OK?

YES →

Is the connector wiring OK?
NO → Correct the connector wiring.

Are the communications conditions OK?
NO → Change the communications conditions to match.

Is there a response?
YES →

Does the monitor display show 10, 11, or 12?

YES → Are the communications conditions OK?

YES → Is the noise environment OK?

YES →

Are the communications conditions OK?
NO → Change the communications conditions to match.

Is the noise environment OK?
NO → Implement noise countermeasures.

Does the monitor display show 10, 11, or 12?
NO →

Does the monitor display show 13?

YES → Is the FCS calculation correct?

YES →

Is the FCS calculation correct?
NO → Calculate the FCS correctly.

Does the monitor display show 13?
NO →

Does the monitor display show 14?

YES → Is the command format correct?

YES →

Is the command format correct?
NO → Send with the correct command format.

Does the monitor display show 14?
NO →

Does the monitor display show 18?

YES → Is the command longer than the specified length?

YES →

Is the command longer than the specified length?
NO → Reduce the command length to within the specified range.

Does the monitor display show 18?
NO →

OK

Is the host device operating normally?
NO → Correct the host program or replace the host device.

Is the host device operating normally?
YES → Replace the Controller.

SECTION 6 Troubleshooting

Tag Communications Check Flow

SECTION 7
Appendices

Specifications and Dimensions

General Specifications

Item	Specifications
Supply voltage (power consumption)	24 VDC +10%/−15% (15 W max., 0.8 A max.)
Ambient operating temperature	−10 to 55°C (with no icing)
Ambient operating humidity	25% to 85% (with no condensation)
Ambient storage temperature	−25 to 65°C (with no icing)
Ambient storage humidity	25% to 85% (with no condensation)
Insulation resistance	20 MΩ min. (at 500 VDC) between power supply terminals and casing and between the ground and power supply terminals
Dielectric strength	1000 VAC (50/60 Hz) for 1 minute between power supply terminals and casing and between the ground and power supply terminals
Vibration resistance	Destruction: 10 to 150 Hz, 0.2-mm double amplitude at 15 m/s^2 in X, Y, and Z directions ten sweeps each for 8 minutes
Shock resistance	150 m/s^2
Dimensions	105 × 90 × 65 mm (excluding protruding parts)
Degree of protection	Panel-mounting (conforms to IP20)
Material	PC/ABS resin
Weight	Approx. 300 g
Mounting method	DIN Track or M4 screws
Antennas	V680-CA5D01-V2:1ch V680-CA5D02-V2:2ch

Communications Specifications

Item	Specifications	
	RS-232C	RS-422/RS-485
Connector specifications	9-pin D-sub connector socket; M2.6 lock screws	5-pin connector manufactured by Phoenix Contact: MC1.5/5GF-3.5
Communications method	Half-duplex serial	4-/2-wire half duplex serial
Baud rate	9,600 bps, 19,200 bps, 38,400 bps, or 115,200 bps	
Data length	7/8 bits	
Stop bit length	1/2 bits	
Error detection	Parity (even/odd/none)	
Cable length	15 m max.	Total length: 500 m max.

I/O Specifications

●Input Specifications (RST, TRG, TRG2)

Input voltage	24 VDC +10% (including ripple) −15% (either PNP or NPN)
Input impedance	2.2 kΩ
Input current	10 mA typical (24 VDC)
ON voltage	19 V min.
OFF voltage	5 V max.
Input response time	70 ms max.

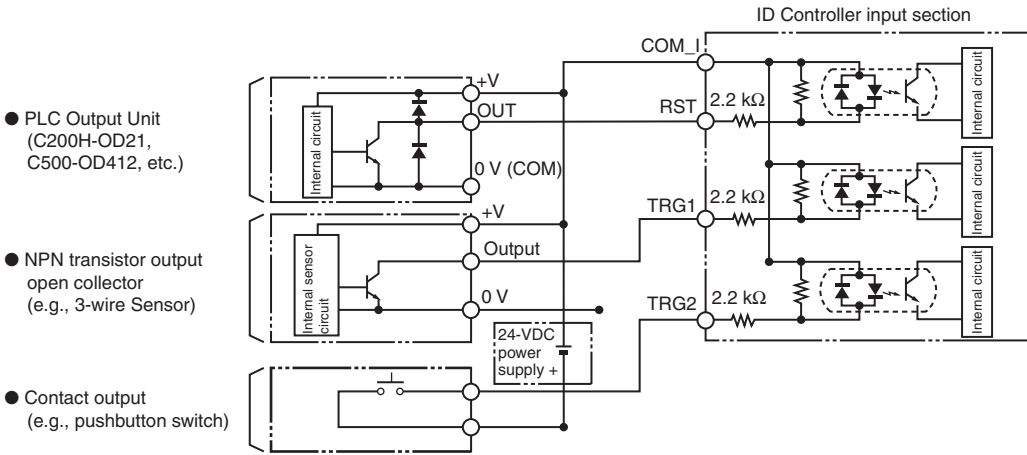●Output Specifications (RUN, BUSY/OUT3, ERROR/OUT4, OUT1, OUT2)

Maximum switching capacity	24 VDC +10% (including ripple) −15% 100 mA, PhotoMOS relay output (either PNP or NPN)
Leakage current	100 μA max.
Residual voltage	2.0 V max.

Note 1. When the RST input turns ON, the CPU stops operation, the RST indicator lights, and the ERROR output is reset.

2. The transistor may be damaged if the output is short-circuited with no load.
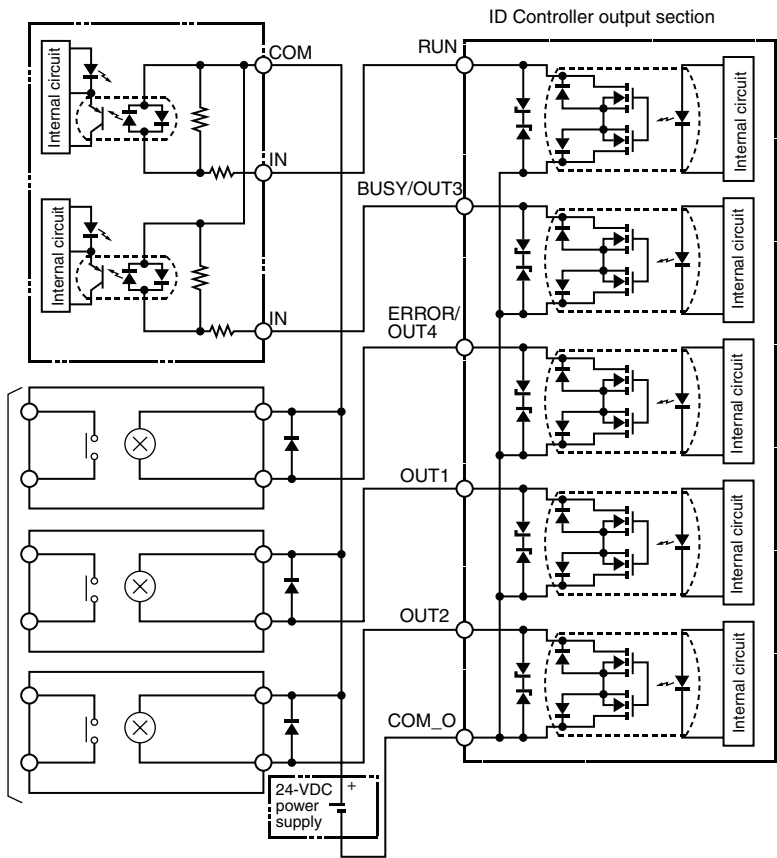
■ Example Wiring to Input Devices
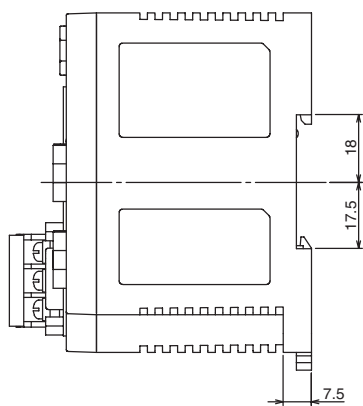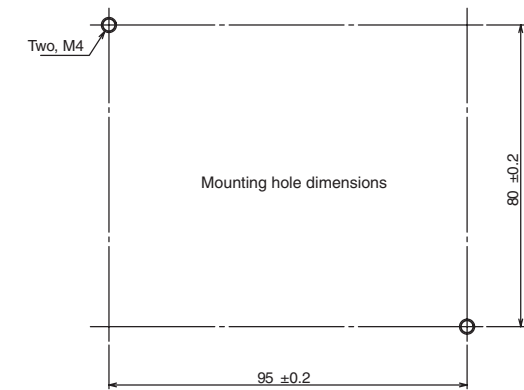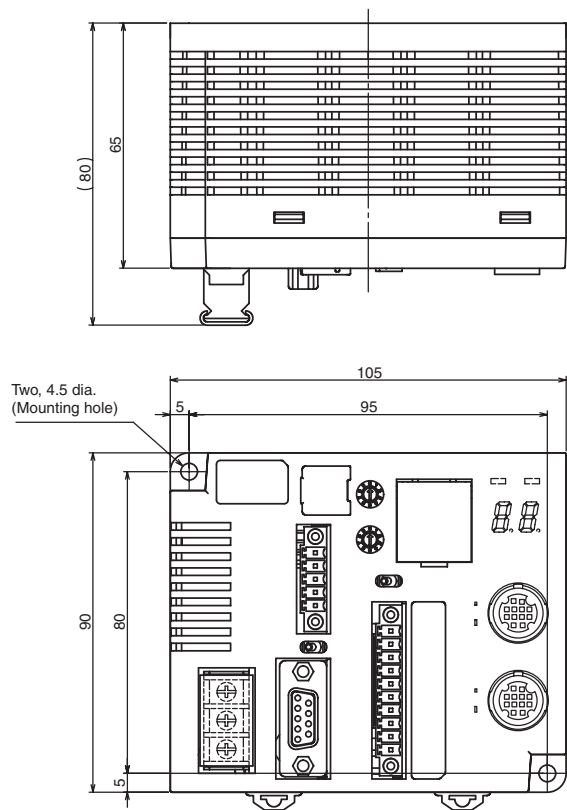 ▪ Input Section

▪ Output Section

Dimensions

Two, 4.5 dia.
(Mounting hole)

105

5

95

90

80

65

(80)

5

Two, M4

Mounting hole dimensions

80 ±0.2

95 ±0.2

18

17.5

7.5

(Unit: mm)

Characteristics According to Operating Conditions

Communications Area (Reference)

The following diagram shows the communications area for the V680 Series. The communications area depends on the installation conditions and environmental conditions.

The following diagram shows the communications area when a Tag passes by and perpendicular to the center of the Antenna. The Antenna and Tag surfaces are parallel to each other.

● V680-HS63 & V680-D2KF67

• Read/Write
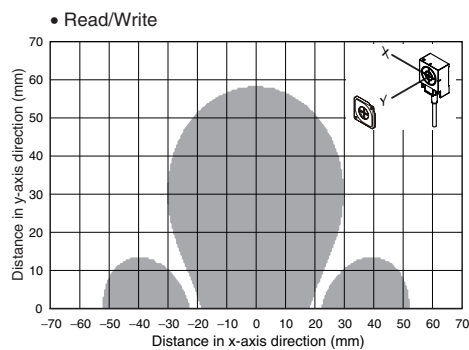
Tag Communications Time and Turn Around Time (Reference)

■ Communications Time
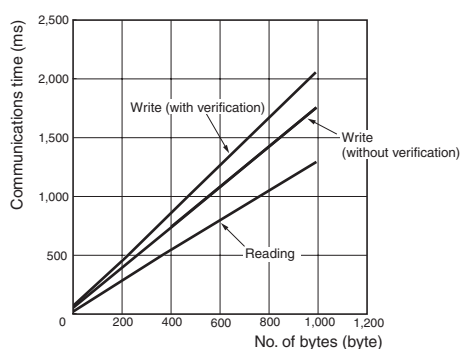
V680-HA63A , V680-HS@@, V680-D1KP@@

V680-H01, V680-D1KP58HT

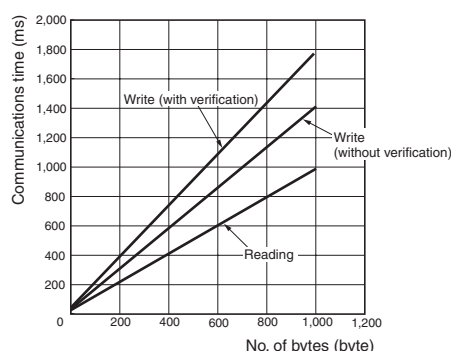| Communications speed setting	Command	Communications time N: No. of bytes processed
Normal mode	Read	T = 1.3 N + 31
	Write (with verification)	T = 2.1 N + 58
	Write (without verification)	T = 1.8 N + 56
High-speed mode (See note.)	Read	T = 1.0 N + 29
	Write (with verification)	T = 1.8 N + 51
	Write (without verification)	T = 1.5 N + 47

Note: The high-speed mode cannot be used with the V680-H01 Antenna.
When using multi-access or FIFO communications options, normal-mode communications speed will be used regardless of the high-speed mode setting.

Communications speed: Normal mode　　　**Communications speed: high-speed mode**

V680-HA63B, V680-HS@@, V680-D2KF@@

Communications speed setting	Command	Communications time N: No. of bytes processed
Normal mode	Read	T = 1.2 N + 30
	Write (with verification)	T = 2.4 N + 49
	Write (without verification)	T = 1.2 N + 49
High-speed mode (See note.)	Read	T = 0.9 N + 27
	Write (with verification)	T = 1.7 N + 49
	Write (without verification)	T = 0.9 N + 41

Note: When using multi-access or FIFO communications options, normal-mode communications speed will be used regardless of the high-speed mode setting.

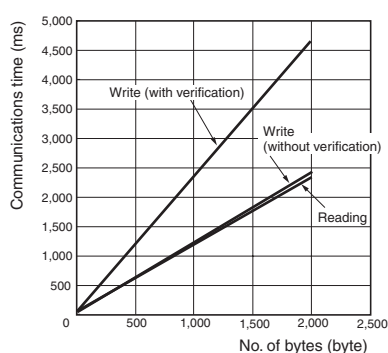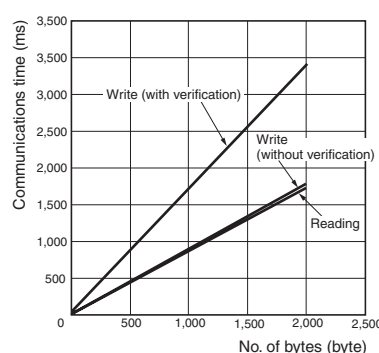**Communications speed: Normal mode**　　　**Communications speed: high-speed mode**

SECTION 7 Characteristics According to Operating Conditions

V680-HA63B, V680-HS@@, V680-D8KF@@, V680-D32KF@@

Communications speed setting	Command	Communications time N: No. of bytes processed
Normal mode	Read	T = 1.3 N + 30
	Write (with verification)	T = 1.6 N + 59
	Write (without verification)	T = 1.3 N + 50
High-speed mode (See note.)	Read	T = 0.8 N + 25
	Write (with verification)	T = 1.1 N + 41
	Write (without verification)	T = 0.9 N + 40

Note: When using multi-access or FIFO communications options, normal-mode communications speed will be used regardless of the high-speed mode setting.

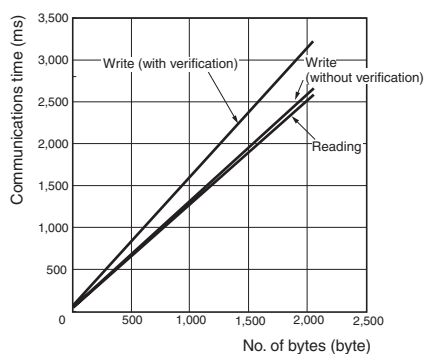**Communications speed: Normal mode**   **Communications speed: high-speed mode**
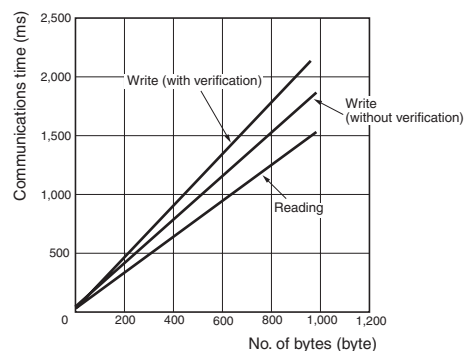
■ TAT (Turn Around Time)

- "TAT" is the total time from the start of command transmission by the host device (e.g., a personal computer) until a response is received by the host device.

TAT = Command transmission time + Tag communications time + Response transmission time

|	
Command transmission time:	The time required to send a command from the host device to the ID Controller. The command transmission time varies depending on the baud rate and the communications format.
Tag communications time:	The processing time for communications between the Antenna and Tag. This is the value found above.
Response reception time:	The time required to return a response from the ID Controller to the host device. The response reception time varies depending on the baud rate and the communications format.

▪ Normal Commands
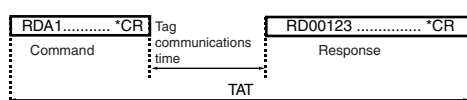
▪ EXPANSION READ Command
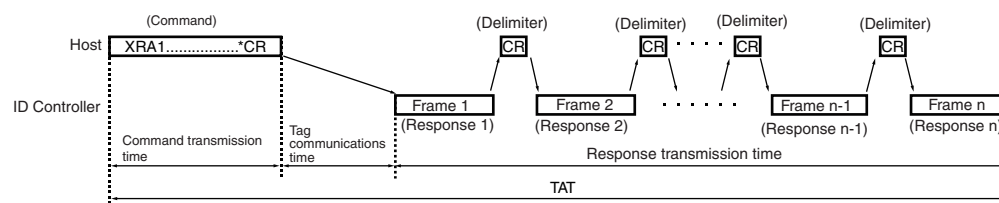
▪ EXPANSION WRITE Command
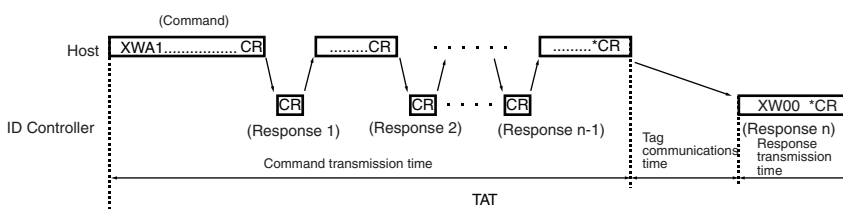
V680-HA63A, V680-HS@@, V680-D1KP@@, V680-H01, V680-D1KP58HT

Conditions	No. of bytes pro-cessed (byte)	9,600 bps (ms)	19,200 bps (ms)	38,400 bps (ms)	115,200 bps (ms)
Read Communications speed Normal mode	100	302	231	196	173
	256	684	524	443	389
	512	1,311	1,003	850	747
	1,000	2,501	1,921	1,621	1,431
Write With verification Communications speed Normal mode	100	409	338	303	280
	256	916	756	675	621
	512	1,748	1,440	1,287	1184
	1,000	3,328	2,748	2,448	2,258
Write Without verification Communications speed Normal mode	100	377	306	271	248
	256	837	677	596	542
	512	1,592	1,284	1,131	1,028
	1,000	3,026	2,446	2,146	1,956
Read (See note 1.) Communications speed High-speed mode	100	270	199	164	141
	256	605	445	364	310
	512	1,155	847	694	591
	1,000	2,199	1,619	1,319	1,129
Write (See note 1.) With verification Communications speed High-speed mode	100	372	301	266	243
	256	832	672	591	537
	512	1,587	1,279	1,126	1,023
	1,000	3,021	2,441	2,141	1,951
Write (See note 1.) Without verification Communications speed High-speed mode	100	338	267	232	209
	256	751	591	510	456
	512	1,429	1,121	968	865
	1,000	2,717	2,137	1,837	1,647

Note 1. The V680-H01 Antenna cannot be used in high-speed mode because it will result in an error.
When using multi-access or FIFO communications options, normal-mode communications speed will be used regardless of the high-speed mode setting.

2. TAT data is for a V680-CA5D01/02-V2 ID Controller with the following communications settings: 8-bit data length, 1 stop bit, and odd parity. Data was sent continuously without breaks between characters.

3. The number of bytes for TAT data is when the code designation is set to ASCII.

V680-HA63B, V680-HS@@, V680-D2KF@@

Conditions	No. of bytes processed (byte)	9,600 bps (ms)	19,200 bps (ms)	38,400 bps (ms)	115,200 bps (ms)
Read Communications speed Normal mode	100	291	220	185	162
	256	658	498	417	363
	512	1,259	951	798	695
	1,000	2,400	1,820	1,520	1,330
	2,000	4,760	3,590	3,020	2,620
Write With verification Communications speed Normal mode	100	430	359	324	301
	256	984	824	743	689
	512	1,892	1,584	1,431	1,328
	1,000	3,619	3,039	2,739	2,549
	2,000	7,139	4,849	5,439	5,039
Write Without verification Communications speed Normal mode	100	310	239	204	181
	256	677	517	436	382
	512	1,278	970	817	714
	1,000	2,419	1,839	1,539	1,349
	2,000	4,779	2,449	3,039	2,639
Read (See note. 1) Communications speed High-speed mode	100	261	190	155	132
	256	581	421	340	286
	512	1,105	797	644	541
	1,000	2,100	1,520	1,220	1,030
	2,000	4,160	1,830	2,420	2,020
Write (See note 1.) With verification Communications speed High-speed mode	100	360	289	254	231
	256	805	645	564	510
	512	1,534	1,226	1,073	970
	1,000	2,919	2,339	2,039	1,849
	2,000	5,779	3,449	4,039	3,639
Write (See note 1.) Without verification Communications speed High-speed mode	100	272	201	166	143
	256	592	432	351	297
	512	1,116	808	655	552
	1,000	2,111	1,531	1,231	1,041
	2,000	4,171	1,841	2,431	2,031

Note 1. When using multi-access or FIFO communications options, normal-mode communications speed will be used regardless of the high-speed mode setting.

2. TAT data is for a V680-CA5D01/02-V2 ID Controller with the following communications settings: 8-bit data length, 1 stop bit, and odd parity. Data was sent continuously without breaks between characters.

3. The number of bytes for TAT data is when the code designation is set to ASCII.

SECTION 7 Characteristics According to Operating Conditions

V680-HA63B, V680-HS@@, V680-D8KF@@, V680-D32KF@@

Conditions	No. of bytes processed (byte)	9,600 bps (ms)	19,200 bps (ms)	38,400 bps (ms)	115,200 bps (ms)
Read Communications speed Normal mode	100	301	230	195	172
	256	683	523	442	388
	512	1,310	1,002	849	746
	1,000	2,500	1,920	1,620	1,430
	2,000	4,960	2,630	3,220	2,820
Write With verification Communications speed Normal mode	100	360	289	254	231
	256	789	629	548	494
	512	1,493	1,185	1,032	929
	1,000	2,829	2,249	1,949	1,759
	2,000	5,589	3,259	3,849	3,449
Write Without verification Communications speed Normal mode	100	321	250	215	192
	256	703	543	462	408
	512	1,330	1,022	869	766
	1,000	2,520	1,940	1,640	1,450
	2,000	4,980	2,650	3,240	2,840
Read (See note 1.) Communications speed High-speed mode	100	246	175	140	117
	256	550	390	309	255
	512	1,049	741	588	485
	1,000	1,995	1,415	1,115	925
	2,000	3,955	1,625	2,215	1,815
Write (See note 1.) With verification Communications speed High-speed mode	100	292	221	186	163
	256	643	483	402	348
	512	1,219	911	758	655
	1,000	2,311	1,731	1,431	1,241
	2,000	4,571	2,241	2,831	2,431
Write (See note 1.) Without verification Communications speed High-speed mode	100	271	200	165	142
	256	591	431	350	296
	512	1,115	807	654	551
	1,000	2,110	1,530	1,230	1,040
	2,000	4,170	1,840	2,430	2,030

Note 1. When using multi-access or FIFO communications options, normal-mode communications speed will be used regardless of the high-speed mode setting.

2. TAT data is for a V680-CA5D01/02-V2 ID Controller with the following communications settings: 8-bit data length, 1 stop bit, and odd parity. Data was sent continuously without breaks between characters.

**3.** The number of bytes for TAT data is when the code designation is set to ASCII.

Calculating Tag Speed

When communicating with a moving Tag, specify an AUTO command or POLLING command.
The maximum speed for communicating with the Tag can be calculated simply using the following formula.

$$\text{Maximum speed} = \frac{\text{D (Distance travelled in communications area)}}{\text{T (Communications time)}} \times \text{Safety factor (0.5)}$$

D (Distance travelled in communications area) is calculated from the actual measurement or the communications area between the Antenna and Tag.

Unit: mm
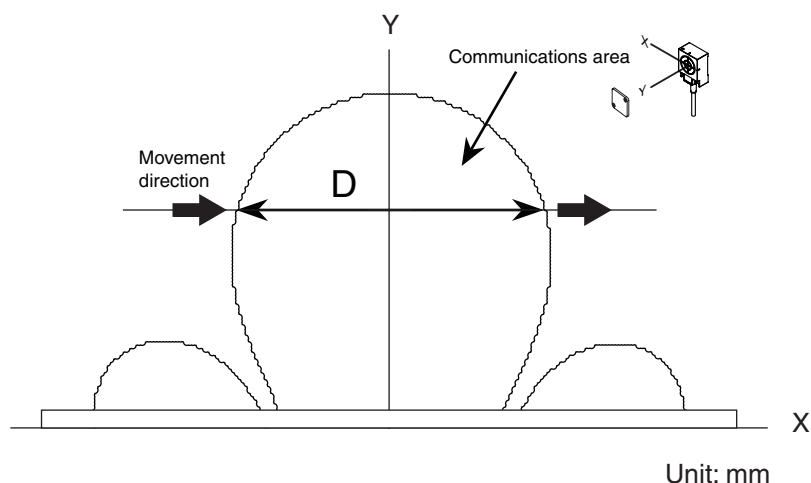
■ Calculation Example

The following example is for reading 256 bytes with the V680-D2KF67, V680-HA63, and V680-HS63.
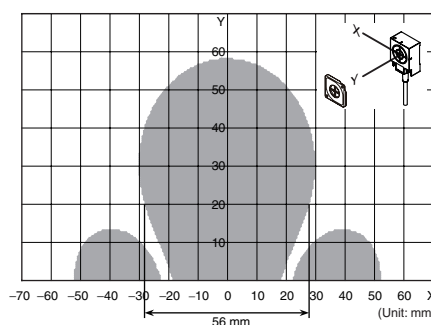
From the above chart,

Distance travelled in communications area = 56 mm when Y (communications distance) is 20 mm
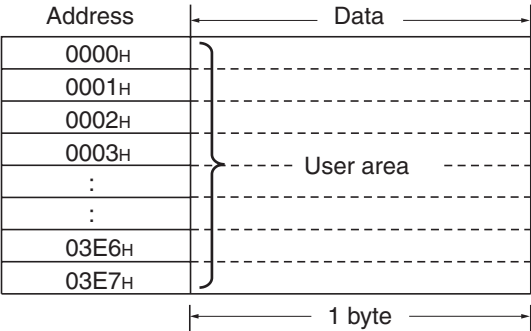
Communications time T = 317 ms

Therefore, the maximum speed of the Tag is as follows:

$$\text{Maximum speed} = \frac{\text{D (Distance travelled in communications area)}}{\text{T (Communications time)}} = \frac{56\ \text{(mm)}}{317\ \text{(ms)}}$$
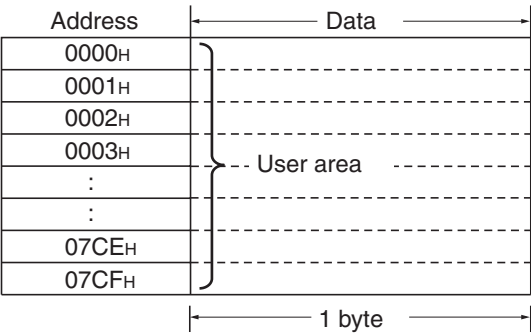$$= 10.60\ \text{m/min}$$

Note 1. The distance travelled in the communications area depends on the read/write distance and axis deflection. Refer to the *Communications Area (Reference)*.
Refer to *V680 Series User's Manual for Amplifiers, Antennas, and ID Tags (EEPROM)*, Cat. No. Z262, and *V680 Series User's Manual for Amplifiers, Antennas, and ID Tags (FRAM)*, Cat. No. Z248.

2. The maximum speed calculated here is a guideline. Always test actual performance in advance.

3. Error processing for communications with the host device and Tag communications is not considered in the above calculations.
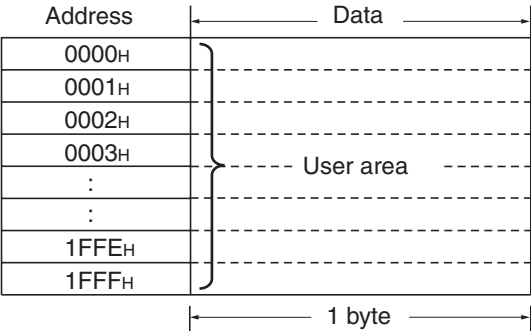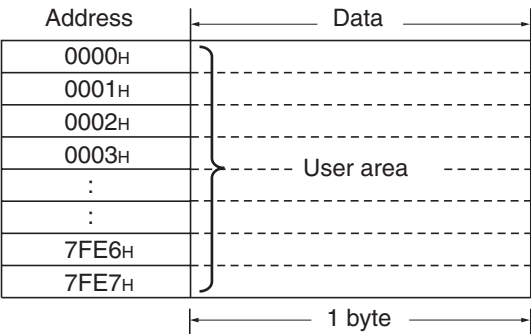
Tag Memory Map

■ Memory Map for the V680-D1KP@@

Address	Data
0000H	
0001H	
0002H	
0003H	User area
:	
:	
03E6H	
03E7H	

1 byte

■ Memory Map for the V680-D2KF@@

Address	Data
0000H	
0001H	
0002H	
0003H	User area
:	
:	
07CEH	
07CFH	

1 byte

■ Memory Map for the V680-D8KF68

Address	Data
0000H	
0001H	
0002H	
0003H	User area
:	
:	
1FFEH	
1FFFH	

1 byte

■ Memory Map for the V680-D32KF68

Address	Data
0000H	
0001H	
0002H	
0003H	User area
:	
:	
7FE6H	
7FE7H	

1 byte

For information on memory capacity and memory types, refer to *Tag Memory Capacity and Memory Type.*

Tag Memory Capacity and Memory Type

(As of October 2006)

Model	Memory capacity (user memory)	Memory type	Life expectancy
V680-D1KP52MT V680-D1KP66T V680-D1K66MT	1,000 bytes	EEPROM	• Rewrite cycles: 100,000 cycles for each address (25°C) • Data backup: 10 years (at 85°C max.)
V680-D1K58HT			• Rewrite cycles: 100,000 cycles for each address • Data backup: 10 years **Note:** The data storage time at high temperatures (exceeding 110°C) is 10 accumulative hours.
V680-D2KF52M V680-D2KF67 V680-D1KF67M	2,000 bytes	FRAM	• No. of accesses: 10 billion • Data backup: 10 years (at 55°C)
V680-D8KF68	8,192 bytes		
V680-D32KF68	32,744 bytes		

Note: Refer to the following manuals for more details.

Model	Manual name	Cat. No.
V680-D1KP52MT V680-D1KP66T V680-D1KP66MT	*V680 Series User's Manual for Amplifiers, Antennas, and ID Tags (EEPROM)*	Z262
V680-D1KP58HT	*V680 Series User's Manual for Heat-resistant RFID Systems*	Z221
V680-D2KF52M V680-D2KF67 V680-D1KF67M	*V680 Series User's Manual for Amplifiers, Antennas, and ID Tags (FRAM)*	Z248
V680-D8KF68		
V680-D32KF68		

ASCII Table

Leftmost digit / Rightmost digit — b8 to b5		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
b4 to b1	Column / Row	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0000	0	NUL	TC7(DLE)	(SP)	0	@	P	`	p	Undefined	Undefined	Undefined	Undefined	Undefined	Undefined	Undefined	Undefined
0001	1	TC1(SOH)	DC1	!	1	A	Q	a	q								
0010	2	TC2(STX)	DC2	"	2	B	R	b	r								
0011	3	TC3(ETX)	DC3	#	3	C	S	c	s								
0100	4	TC4(EOT)	DC4	$	4	D	T	d	t								
0101	5	TC5(NEQ)	TC8(NAK)	%	5	E	U	e	u								
0110	6	TC6(ACK)	TC9(SYN)	&	6	F	V	f	v								
0111	7	BEL	TC10(ETB)	'	7	G	W	g	w								
1000	5	FE0(BS)	CAN	(	8	H	X	h	x								
1001	9	FE1(HT)	EM	)	9	I	Y	i	y								
1010	10	FE2(LF)	SUB	*	:	J	Z	j	z								
1011	11	FE3(VT)	ESC	+	;	K	[	k	{								
1100	12	FE4(FF)	IS4(FS)	,	<	L	\	l	|								
1101	13	FE5(CR)	IS3(GS)	-	=	M	]	m	}								
1110	14	SO	IS2(RS)	.	>	N	^	n	‾								
1111	15	SI	IS1(US)	/	?	O	_	o	DEL								

Note 1. The item in column 5, row 12 is a backslash (\) in ASCII.

2. Do not use undefined areas.

Degree of Protection

Ingress protection degrees (IP-@@) are determined by the following tests. Be sure to check the sealing capability under the actual operating environment and conditions before actual use.

IP indicates the ingress protection symbol.

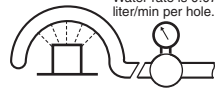■ IEC (International Electrotechnical Commission) Standards
IEC 60529: 1989-11

IP-□□
  └(B)
 └(A)
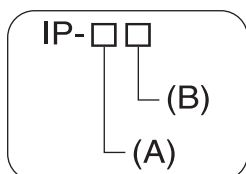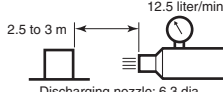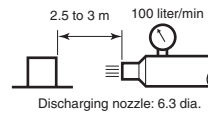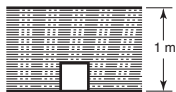
(A) First Digit: Degree of Protection from Solid Materials

Degree		Degree
0		No protection
1	50 mm dia.	Protects against penetration of any solid object such as a hand that is 50 mm or more in diameter.
2	12.5 mm dia.	Protects against penetration of any solid object, such as a finger, that is 12.5 mm or more in diameter.
3	2.5 mm	Protects against penetration of any solid object, such as a wire, that is 2.5 mm or more in diameter.
4	1 mm	Protects against penetration of any solid object, such as a wire, that is 1 mm or more in diameter.
5		Protects against penetration of dust of a quantity that may cause malfunction or obstruct the safe operation of the product.
6		Protects against penetration of all dust.

(B) Second Digit: Degree of Protection Against Water

Degree	Protection		Test method (with pure water)
0	No protection	Not protected against water.	No test
1	Protection against water drops	Protects against vertical drops of water towards the product.	Water is dropped vertically towards the product from the test machine for 10 min. 200 mm
2	Protection against water drop	Protects against drops of water approaching at a maximum angle of 15° to the left, right, back, and front from vertical towards the product.	Water is dropped for 2.5 min each (i.e., 10 min in total) towards the product inclined 15° to the left, right, back, and front from the test machine. 15° 200 mm

Degree	Protection		Test method (with pure water)
3	Protection against sprinkled water	Protects against sprinkled water approaching at a maximum angle of 60° from vertical towards the product.	Water is sprinkled for 10 min at a maximum angle of 60° to the left and right from vertical from the test machine. Water rate is 0.07 liter/min per hole.
4	Protection against water spray	Protects against water spray approaching at any angle towards the product.	Water is sprayed at any angle towards the product for 10 min from the test machine. Water rate is 0.07 liter/min per hole.
5	Protection against water jet spray	Protects against water jet spray approaching at any angle towards the product.	Water is jet sprayed at any angle towards the product for 1 min per square meter for at least 3 min in total from the test machine. 12.5 liter/min, 2.5 to 3 m, Discharging nozzle: 6.3 dia.
6	Protection against high pressure water jet spray	Protects against high-pressure water jet spray approaching at any angle towards the product.	Water is jet sprayed at any angle towards the product for 1 min per square meter for at least 3 min in total from the test machine. 2.5 to 3 m, 100 liter/min, Discharging nozzle: 6.3 dia.
7	Protection underwater	Resists the penetration of water when the product is placed underwater at specified pressure for a specified time.	The product is placed 1 m deep in water (if the product is 850 mm max. in height) for 30 min. 1 m
8	Protection underwater	Can be used continuously underwater.	The test method is determined by the manufacturer and user.

■ Oil resistance (OMRON in-house standard)

Protection	
Oil-resistant	No adverse affect from oil drops or oil spray approaching from any direction.
Oil-proof	Protects against penetration of oil drops or oil spray approaching from any direction.

Note: This OMRON in-house standard confirms resistance to cutting and other oils. It is equivalent to the former JEM standard.

Revision History

A manual revision code appears as a suffix to the catalog number at the bottom of the front and rear pages.

Cat. No. Z249-E1-02

Revision code

Revision code	Date	Revised contents
01	November 2006	Original production
02	April 2007	Changed model numbers from V680-CA5D@@ to V680-CA5D@@-V2, added information on new functions, and updated relevant specifications and descriptions throughout the manual.